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| **Note for Project TTLs:**  The following TOR is for consulting activities to help a World Bank project team with the preparation and oversight of electric power systems for facilities at the front lines of a country’s COVID-19 response. The activities related to the installation of these systems are covered under a companion TOR to this one.  ESMAP remains available to support project teams with the design and implementation of energy-related activities in response to COVID-19. The key contact for activities related to this TOR is Dana Rysankova, Senior Energy Specialist and Global Lead for Energy Access (drysankova@worldbank.org). |

**Terms of Reference for the Preparation and Management of the Installation of Electric Power Systems for Facilities at the Front Lines of COUNTRY’s COVID-19 Response**

# Summary

This Terms of Reference (TOR) is for a single firm to provide consulting services to the World Bank-supported PROJECT NAME (P NUMBER), which is being restructured to aid in the Government of COUNTRY’s emergency response to the COVID-19 pandemic. The consultant will support the preparation and oversight of the installation of electric power systems for key facilities in COUNTRY.

For the purposes of this TOR, the types of facilities targeted for urgent intervention are:

* Type 1 Facility: Hospitals in urban and peri-urban areas that are connected to the main grid, but which receive unreliable power
* Type 2 Facility: Primary health clinics and smaller hospitals in rural and peri-urban areas that are (a) not connected to the main grid and either depend on diesel generator sets or lack access to electricity or (b) which are connected to the main grid but receive unreliable power
* Type 3 Facility: Temporary emergency facilities that are being established to process and treat overflow patients
* Type 4 Facility: Other buildings that are critical to the country’s COVID-19 response including testing laboratories, cold-storage warehouses, local factories making personal protective equipment, and government offices (both in the capital and elsewhere) coordinating and implementing COVID-19 activities.

The firm will be responsible for the following activities:

Preparation Support

1. Develop a prioritization of facilities for urgent intervention.
2. Conduct an audit (including demand assessment) of the current and expected electricity needs of these priority facilities that are expected to be on the front lines of treating COVID-19 patients.
3. Prepare site-specific and standardized technical requirements for these facilities identified for urgent intervention
4. Identify local (national) and international suppliers and installers of electric power equipment (including containerized integrated power systems), and determine their ability to provide equipment urgently, in what quantities, and at what prices.

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| **Note to Project TTLs:**  If the project team does not already have a consultant under contract who could carry out Activities 2 and 3, or foresees challenges in rapidly onboarding a consultant with sufficient technical capabilities to carry out Activities 2 and 3, these two activities could be added to the TOR for the actual installation of the electric power systems. Thus, in that case, it would be the installation firms that conduct the audit and prepare the technical requirements package for each site. |

Procurement Support

1. Support the Government of COUNTRY with activities related to the preparation and implementation of procurement for all sites identified in Activity 1.

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| **Note to Project TTLs:**   * Considering the urgency of this pandemic, efficiency gains from a full competitive bidding process are not worth the added weeks and months that they require, in addition to the inflexibility of standard contracting requirements. We recommend that teams engage with their procurement specialist to explore emergency procurement options that can be carried out quickly, virtually and with increased involvement of the WB team.[[1]](#footnote-1) Options are provided in the Procurement Support section of this TOR. |

Management and Oversight Support

1. Oversee the installation of the electric power systems including quality control
2. Oversee the operations and maintenance of the electric power system for the duration of the operations and maintenance period
3. Assist with the development of a strategy to hand over the electric power systems to competent owner-operators
4. In the case of Type 2 facilities in rural or peri-urban areas, assist with the preparation of a comprehensive strategy to use the newly installed standalone electric power systems as the basis for mini grids that serve the surrounding community, if economically and physically feasible.

The activities described in this TOR will be competitively tendered under emergency fast-tracked World Bank procurement policies to a single firm. The successful applicant will sign a contractual agreement with GOVERNMENT IMPLEMENTING AGENCY and will receive payments upon successful completion of the agreed milestones.

# Background

An outbreak of the coronavirus disease (COVID-19) caused by the 2019 novel coronavirus (SARS-CoV-2) has been spreading rapidly across the world since December 2019, following the diagnosis of the initial cases in Wuhan, Hubei Province, China. Since the beginning of March 2020, the number of cases outside China has increased thirteenfold and the number of affected countries has tripled. On March 11, 2020, the World Health Organization (WHO) declared a global pandemic as the coronavirus rapidly spreads across the world. As of April 4, 2020, the outbreak has resulted in approximately 1 million cases and more than 50,000 deaths across nearly every country around the world.

COVID-19 is one of several emerging infectious disease outbreaks in recent decades resulting in major outbreaks with significant public health and economic impacts. The last moderately severe influenza pandemics were in 1957 and 1968; each killed more than a million people around the world. Although countries are now far more prepared than in the past, the world is also far more interconnected, and many more people today have behavior risk factors such as tobacco use and pre-existing chronic health problems that make viral respiratory infections like COVID-19 particularly dangerous.

Scientists are still trying to understand the full picture of COVID-19’s symptoms and severity. Approximately 20 percent of all confirmed cases require hospitalization, and 5 percent of all confirmed cases require intensive care typically consisting of mechanically powered respiration through the use of respirators or the surgical procedure of intubation. Patients admitted to hospitals and clinics with moderate to severe symptoms can expect to remain there for an average of about two weeks. While around 5 percent of the people worldwide confirmed as having been infected have died (the so-called “case fatality rate”), the World Health Organization has been careful not to describe this as the mortality rate or death rate of COVID-19. This is because in an unfolding epidemic it can be misleading to look simply at the estimate of deaths divided by cases so far.

COVID-19 is highly contagious: each infected person is expected to infect an additional 2-3 people, and asymptomatic people are infectious. To date, there is no cure or vaccine for COVID-19. There have been no clinically proven efficacious treatments for COVID-19, but a handful of drugs appear to increase the life expectancy in patients with severe symptoms. Most of these drugs are currently in early stage clinical trials to prove or disprove their efficacy as COVID-19 treatments. Meanwhile, experts agree that a vaccine is still more than a year away even if several companies and laboratories are actively developing vaccine candidates for clinical trials.

As a result of the characteristics of COVID-19 as a disease and the limited healthcare options available to support moderately and critically ill patients, the best option available to governments today is to enact and enforce strict “social distancing” measures that drastically reduce the contact that individuals have with each other. One consequence of these measures is the dramatic slowdown of the national economy and the disruption to most supply chains.

It is in this context that the World Bank is supporting COUNTRY’s response to COVID-19 through a restructuring of PROJECT NAME. A core component of this restructuring is to urgently provide reliable electric power to facilities that will be on the front lines of caring for COVID-19 patients.

COVID19 presents unique and severe challenges to health care systems in World Bank client countries and around the world. The World Bank and UN are making billions of dollars in emergency loans available to governments to prepare for the ongoing spread of the pandemic, including the purchase of ventilators and oxygen supplies, and ramping up staff where possible, and to manage the economic impact of the crisis. A reliable electricity supply is among one of the many requirements that must be in place for a country’s health care system to address the crisis.

The World Bank can play a critical role in addressing the urgent electricity needs for hospitals and clinics during the COVID-19 crisis. Solutions can be distinguished according to the site's power demands and supply options, considering unique needs for COVID-19 response. Power demands range from large urban hospitals with unreliable grids to unelectrified rural clinics with few resources. Supply options include some combination of diesel generators (subject to fuel supply), batteries and inverters, and solar PV.

# Types of Facilities Targeted for Support

The four types of facilities expected to be supported by activities covered under this TOR are the following:

**Type 1 Facility: Hospitals (on-grid, but often with intermittent supply)**

It is expected that hospitals (especially larger ones with at least 200 beds) in urban areas will be designated to treat COVID19 patients. In many cases these will have electricity supplies from the national grid and already have diesel backup generators.

**Type 2 Facility: Rural Clinics, Primary Health Centers, Small Rural Hospitals (off-grid or on-grid with unreliable supply)**

Rural clinics, primary health centers and small rural hospitals that are not assigned treating COVID19 patients should be included in the emergency response where possible. Even if not as urgent as COVID19 centers, these clinics and health centers are still in the frontline of the fight against the pandemic as they are often the only place that sick patients can access in rural areas. As major hospitals focus on COVID19, these facilities will also need to treat other patients, including those that would typically be referred to hospitals. They are likely to provide palliative care, and possibly serve as referral clinics for more severe cases. Moreover, these clinics and health centers will gain more prominence if the pandemic spreads to rural communities; hence it is essential that they are also well equipped.

These facilities are more likely to be located in areas with no national grid, or if grid electricity is available it is likely to be less reliable than in more urban areas. Many have no electricity of any kind. At these sites it is more likely there will be adequate space for solar arrays. Diesel fuel supply chains will likely be more fragile, and grid extension would be unviable. For all of these reasons, solar electric systems will likely be an appropriate solution, if they can be installed relatively quickly.

It should be noted that even though diesel based solutions could help mitigate immediate concerns, solar systems (solar PV + Battery) or a hybrid of solar and diesel solutions could be more affordable, sustainable, and resilient in the medium (6 months and beyond) to long term. This is primarily due to two reasons: Diesel fuel supply will be a significant risk in many of client countries particularly during a global crisis such as COVID which could last over a year. Moreover, the high cost of diesel may allow health institutions to use it only for a few hours, thus compromising health care that could be needed 24/7 amid the coronavirus pandemic

**Type 3 Facility: Temporary Emergency COVID19 Facilities**

Temporary emergency facilities for processing and treating COVID19 patients are expected to be set up in a number of countries. These will serve as isolation wards for suspected cases and for confirmed cases, with facilities for treatment of acute cases. These will often be built adjacent to existing hospitals, with screening facilities to separate COVID-suspected patients from non-COVID cases.

**Type 4 Facility: Non-clinic Facilities: cold chain, testing labs, and other critical facilities**

Certain promising drugs for COVID19 treatment and any eventual vaccine will need cold-chain facilities that keep them chilled in all stages from production to final delivery in village clinics. This will require reliable 24/7 electricity to power cooled warehouses and refrigeration down to the level of clinics and dispensaries. Where the grid is not available, cooled warehouses will be most cost-effectively served by 24/7 electricity from hybrid solar/diesel systems. Where grid electricity is available but not reliable, battery/inverter systems or backup generators will be needed. At the level of clinics and dispensaries, highly reliable direct-drive solar vaccine refrigerators can keep vaccines and medicines cool without the need for batteries. Testing is proving to be essential in the fight against COVID19, and laboratories will require electricity to process test samples and communicate results. Masks and other personal protective equipment – essential for healthcare workers encountering COVID19 patients – is in limited supply worldwide. As a result, local workshops and factories will need to produce additional supplies. These factories will need electricity to operate sewing machines and other equipment. Finally, government buildings coordinating COVID-19 response (including facilities outside the capital coordinating sub-nationally) would also be candidates for priority support in terms of guaranteeing 24/7 electricity.

# Description of Activities and Deliverables

## Preparation Support Activities

The activities of this TOR and their associated deliverables are as follows:

### 1. Develop a prioritization of facilities for urgent intervention.

In consultation with the government and health sector experts, the consultant will: a) develop a set of criteria by which to prioritize sites for urgent intervention; and, b) use these criteria to develop a prioritized list of sites for urgent intervention.

In general, the criteria for prioritization should include, but are not limited to, the size of the catchment population served by the healthcare facility, the population density of the catchment area of the healthcare facility, the areas prone to COVID-19, the criticality of the facility’s role in the country’s COVID-19 response, and the current reliability of electricity supply at the facility.

Prioritization should indicate those facilities that require immediate intervention (within 2 weeks), intermediate intervention (within 1-2 months), and other critical interventions (within 3-6 months).

### 2. Conduct an audit of the current and expected electricity needs of facilities that are expected to be on the front lines of treating COVID-19 patients.

Rapid Energy Audit of Type 1 Facilities

Faced with rapid growth in confirmed COVID-19 cases, countries are designating specific healthcare facilities to treat COVID-19 patients. World Bank colleagues working in COUNTRY’s health sector have compiled a list of larger facilities, typically in urban areas, that are expected to see a large number of patients. Emergency support packages approved recently by the World Bank, as well as from other donors, are being used to help these larger hospitals prepare and to equip them with equipment and materials they need, including ventilators and oxygen concentrators. Much of the equipment requires large amounts of reliable power to operate safely and effectively. For these larger hospitals, the consultant will conduct a rapid energy audit of what is needed to ensure reliability of electricity supply.

Rapid Survey and Energy Audit of Type 2 Facilities

In coordination with the World Bank project team and the government of COUNTRY, the consultant will also conduct a rapid audit of a representative sample of Type 2 healthcare facilities in rural and peri-urban areas that are not connected to the main grid (no electricity access or connected to diesel sets) or connected to the grid but receiving unreliable power to estimate both the total number of these facilities and to determine the typical energy needs of this type of facility.

Rapid Survey and Energy Audit of Type 3 Facilities

In addition, the consultant will conduct desk research and interviews with experts to estimate the number of temporary COVID-19 facilities that will be constructed to process and treat overflow patients and to determine the typical energy needs of this type of facility.

Rapid Energy Audit of Type 4 Facilities

In coordination with the World Bank project team and the government of COUNTRY, the consultant will also conduct a rapid audit of Type 4 facilities to determine the facilities’ energy needs. For some Type 4 facilities that are numerous throughout the country such as regional government offices coordinating or implementing the government’s COVID-19 activities, the consultant will conduct a rapid audit of a representative sample of these facilities to determine the typical energy needs of this type of facility.

Key Considerations for the Energy Audits

The energy audits should address at least the following questions:

1. What is the facility’s current source of electricity and how is it perceived in terms of reliability, cost and service quality?
2. What are the expected “regular” and “priority” electricity needs in the facility? Create a table of the total quantity, the “priority” quantity (the quantity that is necessary to keep running even in a power outage), the power consumption of the appliance, and hours per day each medical and non-medical appliance is used. Cross-check the aggregate total of monthly kWh against utility bills, if they exist. Determine if high priority loads should be isolated on a separate circuit from low-priority loads. Include power assessments for staff house and solar water pumping in analysis.
3. What is the reliability of electricity supply from the grid? How many hours per day is electricity not available on average? How many blackouts per day? How many hours per day is the generator run, if applicable?
4. Does the facility have a backup power supply? If diesel generator, what is capacity (kVA). If battery / inverter, what is the battery kWh and inverter kVA?
5. If diesel generators are used, what is the reliability of diesel fuel supply? How many liters of diesel fuel is stored onsite? What is the assessment of the availability of diesel as the infections and economic impacts of COVID19 spread? Is the diesel in working order? If not, what cost estimate to repair it?
6. What are the facility staff’s or auditor’s assessments of the electric power-related gaps that need to be filled?
7. To help determine if a solar array could be considered, what space is available to deploy a solar array? Measure area and distance from electricity mains panel, take photos of available area. Provide latitude and longitude and Google maps satellite image.

*Deliverable: Report and accompanying PowerPoint presentation on the findings of the audits, including something akin to Table 1 below.*

**Table 1: Appliance power consumption and usage hours data for electricity audit, with examples.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Equipment** | **Total quantity of each** | **Priority quantity in power outage** | **Power (watts)** | **Daytime hours (7:00 to 17:59)** | **Evening hours (18:00 to 21:59)** | **Night hours (22:00 to 06:59)** |
| **Example**:  Bedside monitor | 20 | 20 | 10 | 12 | 4 | 8 |
| **Example**:  LED lighting | 15 | 10 | 5 | 0 | 4 | 9 |
| 1. |  |  |  |  |  |  |
| 2. |  |  |  |  |  |  |
| Etc. |  |  |  |  |  |  |

*Deliverable: Prioritized list of facilities requiring urgent intervention.*

### 3. Prepare site-specific and standardized technical requirements for the facilities identified for urgent intervention

Based on the audit conducted in Activity 1, the consultant will prepare load profiles and other technical requirements (e.g., level of service requirement) for each facility where site-specific needs are known (Type 1 and most Type 4 facilities) and standardized load profiles and technical requirements for Type 2 and 3 facilities and some types of type 4 facilities such as regional government offices. Alongside the load profiles and technical requirements, the consultant will also provide site-specific cost estimates.

*Deliverable: Load profiles, technical requirements, and cost estimates for each site on the list of prioritized sites.*

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| **Note for Project TTLs:**  The deliverable for Activity 3 would be incorporated into the TOR for the installation of the electric power systems as Appendix A of that TOR. |

### 4. Identify local (national) and international suppliers and installers of electric power equipment (including containerized integrated power systems), and determine their ability to provide equipment urgently, in what quantities, and at what prices.

To facilitate the rapid procurement and installation of electric power systems in the sites identified in Activity 1, the consultant will develop a list of local (national) and international suppliers of power equipment, including containerized integrated power systems). Colleagues at the World Bank have begun compiling a global list and will make this available to the consultant as a starting point. For each supplier, the consultant should determine the supplier’s ability to provide equipment urgently, in what quantities, and at what prices.

The information collected for each supplier should include, at a minimum:

1. Company name
2. Company location (from where products would be shipped)
3. Company website and contact information
4. Electric power products available, and for each product:
   1. Brand of the product and product name
   2. General technical specifications (e.g., type and capacity of batteries, type and capacity of diesel genset, etc.)
   3. Quantity available within 2 weeks, within 1 month, and within 3 months
   4. Estimated time from purchase order to delivery on site (for containerized solutions, estimated time from purchase order to completed installation)
   5. Price (or price range) per product including any discounts for bulk orders or social/non-profit uses
5. Information on relevant experience the company has in the country (e.g., number of containerized systems deployed and in what context, such as health clinics or schools)
6. Information on any difficulties that the company is experiencing with procuring, storing, and delivering products, and providing after-sales support to their customers

*Deliverable: list of suppliers and installers and their relevant data points.*

## Procurement Support Activities

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| **Note to Project TTLs:**  Considering the urgency of this pandemic, efficiency gains from a full competitive bidding process are not worth the added weeks and months that they require, in addition to the inflexibility of standard contracting requirements. We recommend that teams engage with their procurement specialist to explore emergency procurement options that can be carried out quickly, virtually and with increased involvement of the WB team.3 These may include the following options:   * Identifying a national register of authorized or licensed suppliers/bidders to limit the procurement to only well-established firms; * Preparing a Request for Bids (RFB) that is sent to prospective bidders by email with a short turn-around time (e.g. a week), ideally preceded by a virtual consultation meeting (if there is time) to forewarn them and get their feedback on any outstanding issues; * RFB could be issued with an up-front per-unit cost, allowing the selection of firms to focus entirely on their experience, capacity to deliver, and other issues that can be assessed via a short desk-based evaluation; * If market costs cannot be easily estimated in advance then teams could opt for a two-envelope bidding process based on a ‘sample project’ (e.g. an indicative facility or requirement), perhaps combined with a price cap to guard against collusion. The desk-based evaluation would take place first, and then a live bid opening could be held by videoconference; * Multiple firms could be awarded contracts by splitting up the work, thereby helping to overcome capacity constraints, accelerating implementation, reducing the risk of non-delivery from any single firm, and spreading the economic benefits across the industry; * Firms could be made wholly responsible for site surveying, design, installation and a set number of years of O&M (most likely kept within the project’s duration). Depending on the capacity of the client or PMU a supervision engineer may be required, but this could also be procured via direct selection and could come in later on; * Teams could explore using the WB’s ‘direct payments’ facility if there is a risk that clients will not be able to pay invoices quickly due to lockdown conditions. This may require a revision to the threshold for direct payments as specified in the Financial Agreement.   We recommend a number of different options for structuring the bid cost and contracts, which will depend on the project’s requirements, as follows:   * For relatively simple or standardized projects it may be possible to specify a cost according to different pre-defined packages or kits, with a simplified disbursement schedule according to key milestones * For more complex projects developers could be paid according to a formula based on up to four variables: kWp of the PV array, the kWh of battery, the kVA of diesel genset, and the kVA of inverter, perhaps including geographic factors to take into account logistical expenses of more remote sites. |

### 5. Support the Government of COUNTRY with activities related to the preparation and implementation of procurement for all sites identified in Activity 1.

In collaboration with the Government of COUNTRY and the World Bank project team and procurement specialists, the consultant will assist with the preparation and implementation of all stages of the procurement process for all sites identified in Activity 1.

*Deliverable: Report and accompanying PowerPoint presentation summarizing procurement process and outcomes.*

## Management and Oversight Support Activities

### 6. Oversee the installation of the electric power systems including quality control

The consultant will, through regular site visits and quality control checks, oversee the installation of the electric power systems with relevant quality assurance standards. As part of this activity, the consultant will draft a report *for* *each facility* indicating that the facility’s system has been successfully commissioned (or not) and identifying any defects that need to be corrected during the defects liability period.

*Deliverable: Commissioning reports.*

### 7. Oversee the operations and maintenance of the electric power system for the duration of the operations and maintenance period

The consultant will, through regular site visits and reviews of the reports received by the operations and maintenance contractor, oversee the operations and maintenance of the electric power systems. This activity will last the full duration of the operations and maintenance period, which commences on the date of commissioning and ends 24 months after the date of commissioning or until a long-term operator is identified, whichever occurs first. The consultant will also ensure that technologies such as remote monitoring are regularly upgraded to serve their purpose.

*Deliverable: Quarterly reports on the operations and maintenance status of each of the installed systems.*

### 8. Assist with the development of a strategy to hand over the electric power systems to competent owner-operators

As part of this activity, the consultant will help the Government of COUNTRY to develop a plan for identifying and engaging suitable operators for each of the electric power systems installed under the project. The consultant will also help the Government of COUNTRY ensure a smooth transition between power system operators in order to guarantee uninterrupted supply of electricity during the transition period.

*Deliverable: Report and accompanying PowerPoint presentation recommending a strategy for handing over the electric power system.*

### 9. In the case of Type 2 facilities in rural or peri-urban areas, assist with the preparation of a comprehensive strategy to use the newly installed standalone electric power systems as the basis for mini grids that serve the surrounding community, if economically and physically feasible.

As part of this activity, the consultant will be expected to conduct desk research and interviews to develop a comprehensive strategy to use the facilities’ electric power systems as the basis for developing mini grids in the surrounding communities.

*Deliverable: Report and accompanying PowerPoint presentation recommending a strategy for using the electric power systems installed at appropriate Type 2 facilities as the basis for mini grids that serve the surrounding communities, if feasible.*

# Special Health and Safety Conditions

Given the nature of this assignment, the consultant should indicate the measures it will take to avoid person-to-person transmission of COVID-19 as it carries out all activities under this TOR. This should include personal protective equipment for all employees working in and around the health clinic, remote video-enabled trainings and other meetings whenever possible, and in-country rules for social distancing and personal hygiene.

# Timeline

The anticipated timeline for the activities in this TOR is as follows:

**Table 1: Timeline of TOR Activities**

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| **Activity** | **Expected Time to Completion** |
| 1 – Prioritized Sites | 3 days |
| 2 – Audits | 7 days |
| 3 – Site-specific technical requirements | 3 days |
| 4 – List of suppliers | 3 days |
| 5 – Procurement support | 7-21 days depending on procurement type |
| 6 – Oversee Installation | 30 days from EPC firm signing contract |
| 7 – Oversee O&M | Full duration of the O&M period (24 months) |
| 8 – Strategy for System Hand-over | 3 days |
| 9 – Strategy for mini grid development | 5 days |

# Disbursement Schedule

* 20% of the contract amount paid upon signing the contract
* 10% of the contract amount paid upon successful completion of the audit
* 10% of the contract amount paid upon submission of site-specific technical requirements
* 20% of the contract amount paid upon completion of procurement
* 10% of the contract amount paid upon submission of the last commissioning report
* 10% of the contract amount paid upon submission of the reports on the strategies for system hand-over and for mini grid development
* 20% of the contract amount paid at the end of the operations and maintenance period.

1. Our understanding is that WB teams are allowed to be involved in bid evaluation, bid meetings, and other such steps, which can be used to reduce the number of steps and review required. See also the Health Nutrition and Population GP’s market analysis for COVID-19 response suppliers [here](https://worldbankgroup.sharepoint.com/sites/Health/Documents/HNP%20GP%20COVID-19/COVID%2019%20Market%20Analysis%20OPCS%20Final%20Mar%205%202020.pdf). [↑](#footnote-ref-1)