



The Asia Foundation

# ADAPTING TO ELECTRICITY SHORTAGES

Learning from Yangon Households and Small Businesses

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## **The Asia Foundation**

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# PREFACE

The people of Myanmar face a daily barrage of challenges that are a continual source of financial and mental strain. One of those deserving of attention is the now endemic electricity disruptions affecting people in Yangon, Myanmar's largest city. As with other facets of Myanmar life since 2021, this is a sad story of a reversal of fortunes.

In the 2010s, Myanmar made major improvements, increasing access to and the reliability of electricity. No longer a luxury, electricity has become a cornerstone of modern Myanmar society, playing a fundamental role in the economy and people's daily lives. Yet now, electricity access in Myanmar is on a downward trajectory, amplified by the 2021 military takeover and subsequent political and economic crisis. While unreliable power is not a new challenge facing the Myanmar people, the depth and breadth of the problem have changed, with people's reliance on electricity having increased drastically. What data is available shows that between 2014 and 2019, the share of Yangon households using grid electricity as their main source of lighting increased from 69% to 83%.

Analysis suggests that the energy sector will continue to decline, and even with major immediate intervention, the supply of electricity will not improve in the short to medium term. The impacts of this will be widely felt by households and small businesses, particularly in urban areas. The challenges posed by these power outages encompass both tangible and intangible aspects of daily life; families often must wake during the night to pump water and prepare meals; workers struggle with disrupted sleep patterns and the additional burden of accommodating power outage schedules within their daily routines; parents worry over their daughters' safety when walking home in unlit streets. It literally saps people's energy, limits their freedom, and undermines their personal capabilities. Yet the current political and economic climate deters international and Myanmar actors from investing in electricity infrastructure, making it hard to address these challenges. One possible avenue to reduce adverse effects and support resilience is to provide support directly to households and small businesses.

To assess this opportunity, The Asia Foundation conducted in-depth qualitative research to understand how households and businesses have been impacted by and responded to electricity disruptions. This analysis of the micro-level dynamics compliments the ongoing sectoral analysis from the World Bank, identifies interventions used within this constrained environment, and provides an evidence base to support discussions among stakeholders and develop practical information for distribution to the general public. With access to electricity an enabler of almost every facet of business and life, it is more than just a modern convenience. We hope that through this research report, we can shed light on this topic and contribute to positive improvements for Yangon households and small businesses as they face increasingly severe power outages throughout the year.

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# EXECUTIVE SUMMARY

Access to reliable electricity has been a persistent challenge in Myanmar. However, in recent years, the expectations of individuals, especially in urban centers like Yangon, have significantly increased. In addition, reliance on electricity for basic amenities, like cooking and lighting has increased as has ownership of electronic goods, such as mobile phones and other household appliances. With electricity disruptions to continue in the medium to long term, support is needed to help build individual and community resilience by implementing electricity shortage solutions at the household and small business levels.

Research commissioned by The Asia Foundation sought to understand the solutions people in Yangon during grid electricity outages and share their experiences. The research, conducted between April and May 2023, employed a mixed methods qualitative approach, and included 40 key informant interviews, digital ethnography of 100 Facebook groups, and transect<sup>1</sup> walks in 13 townships in Yangon.

## MAIN FINDINGS

**A growing body of evidence points to an accelerating deterioration in access to reliable grid electricity across Myanmar.** Forecasts predict a continued gap between energy supply and demand in the future, across a range of economic and political scenarios. Due to the time, it takes for new electricity projects to get planned, approved and constructed, the current electricity disruptions will likely persist for years, even with major investment in new power generation facilities or policy and political changes. The problem is especially acute in Yangon.

**While Yangon's consumers understand the annual and seasonal availability of electricity in their city, very few consider the long-term outlook of the energy sector when implementing a solution to power outages.** There is thus a need to inform consumers of the long-term nature of the power crisis in Myanmar to encourage sustainable behaviors in this area. One of the key reasons consumers struggle to adopt a long-term perspective is the intertwined relationship between electricity access, political instability, and energy sector development.

**Power outages restrict access to basic amenities and appliances, creating challenges in the working and business environment, daily activities, and overall well-being.** The research documents extensive indirect secondary effects on health, business productivity, worker output, business investment, and community dynamics.

**While consumers have always navigated power shortages in Yangon, it is an evolving situation that continues to bring new opportunities and challenges.** Expectations have shifted, reliance on electrical goods increased, and new and more technology is now available in the market. There is a crowded

market for potential solutions and while consumers benefit from greater choice, they face more complicated decisions.

**There are no singular magic solutions available to consumers.** Consumers in Yangon adopt mixed combinations of solutions that can be categorized as coping behaviors, adaptations, and alternative power sources. A combination is needed due to financial limitations and constraints in the physical environment.

**While circumstances are unique to each consumer there are lessons available that can guide consumers through their choices and implementation.** The research documents many examples of how consumers have learned and implemented solutions to meet their unique circumstances.

**The key blockages consumers face when trying to implement a solution to power cuts are financial, their physical environment, inability to meet their capacity needs and a complex information environment.** There is a high financial burden to implement, operate and maintain alternative power solutions and some adaptations, that can support multiple electric needs, such as building solar systems, inverters and batteries or generators. While cheaper solutions are available, the constricting economy means even investment in coping and adaptations strategies can be beyond a household's ability. The physical environment of households and small businesses limit the options available to them, while some have been able to overcome these blockages, knowledge, creativity and good community relationships are needed to manage dynamics and be able to implement many solutions.

**Consumers seek guidance from peers who are technical experts and through online social media; these platforms are an opportunity to support more effective adaptations at scale.** Peer experts are a good source of technical knowledge; however, access is inequitable as it relies on individual connections. Social media sources are more open and equitable, with some relevant electricity Facebook page's having over 100,000 members. However, the pages can become dominated by promotional material from sellers and consumers have to decode biased and out of date information.

**A better environment for information seeking, learning and sharing could help consumers implement the solutions available to them.** With consumer knowledge and understanding being anchored in the short term the research identified the risk that solutions being implemented are inadequately meeting current needs and not accounting for expected long-term deterioration in electricity supply in Yangon. Ultimately, the research identifies cause for hope from the remarkable creativity Yangon consumers deploy to address electricity disruptions, and through their willingness to guide others struggling to navigate the solutions.

#### **Recommendations:**

1. Support consumer education and awareness: facilitate information campaigns and awareness programs to educate consumers about the possibilities and how to best select and implement solutions.

2. Foster information sharing and peer-to-peer support: invest in current platforms and networks that facilitate information sharing and peer-to-peer support among households and small businesses for implementing a solution from purchase, operation, and maintenance, especially for alternative power sources.
3. Encourage the development of interdisciplinary innovative solutions: work with a diverse group of stakeholders to develop solutions to reduce electricity demand and ease negative impacts of power outages in Yangon.
4. Facilitate access to reliable and affordable energy solutions: work with local stakeholders to provide financial support, such as microfinance or low-interest loans, to households and small businesses, enabling them to invest in reliable and affordable energy solutions.
5. Support capacity building and technical training: collaborate with local organisations and vocational training institutions to provide capacity building and technical training programs for suppliers and consumers. This is especially important for newer technologies and products available in the marketplace.
6. Establish business support programs: develop targeted support programs for small businesses affected by power shortages. This can include financial planning assistance, business planning guidance, financial and knowledge support for accessing backup power solutions or shared energy infrastructure.
7. Conduct research and pilot projects: invest in research pilot projects to explore innovative and context-specific solutions for households and small businesses in Yangon. This can include testing new technologies, business models and community driven initiatives to address power shortages effectively and sustainably.





# INTRODUCTION

The Myanmar energy sector has long faced challenges managing the growing electricity supply and demand gap. These challenges have been intensified by political instability and the stagnation of consolidated efforts for improvement in the sector at the national level. As a consequence, electricity disruptions have increased in Yangon, and nationwide, resulting in an overall deterioration of quality of life for residents and new challenges for small businesses. With electricity disruptions expected to continue in the medium to long term, support is needed to help build individual and community resilience through the implementation of electricity shortage solutions at the household and small business level.

This research project was undertaken to support urban households and small businesses (consumers) to minimize the impact of sustained power shortages. The research sought to understand solutions utilized by people living in Yangon during periods of grid electricity outages and share their experiences. The research was conducted from April and May 2023, and was guided by four research questions.

## **BOX 1: Key research questions**

- A. To what extent does the general public understand the nature of electricity shortages in Myanmar? What knowledge, attitudes and behaviors demonstrate their level of understanding?
- B. How have electricity shortages impacted households and small businesses?
- C. Map the key methods utilized by the general public to overcome power shortages in their households and businesses. What inputs are required to implement these methods? How do these methods overcome the power shortages?
- D. In decision making processes, what are the main considerations and priorities of households and small businesses? What challenges do they face in deciding on solutions?

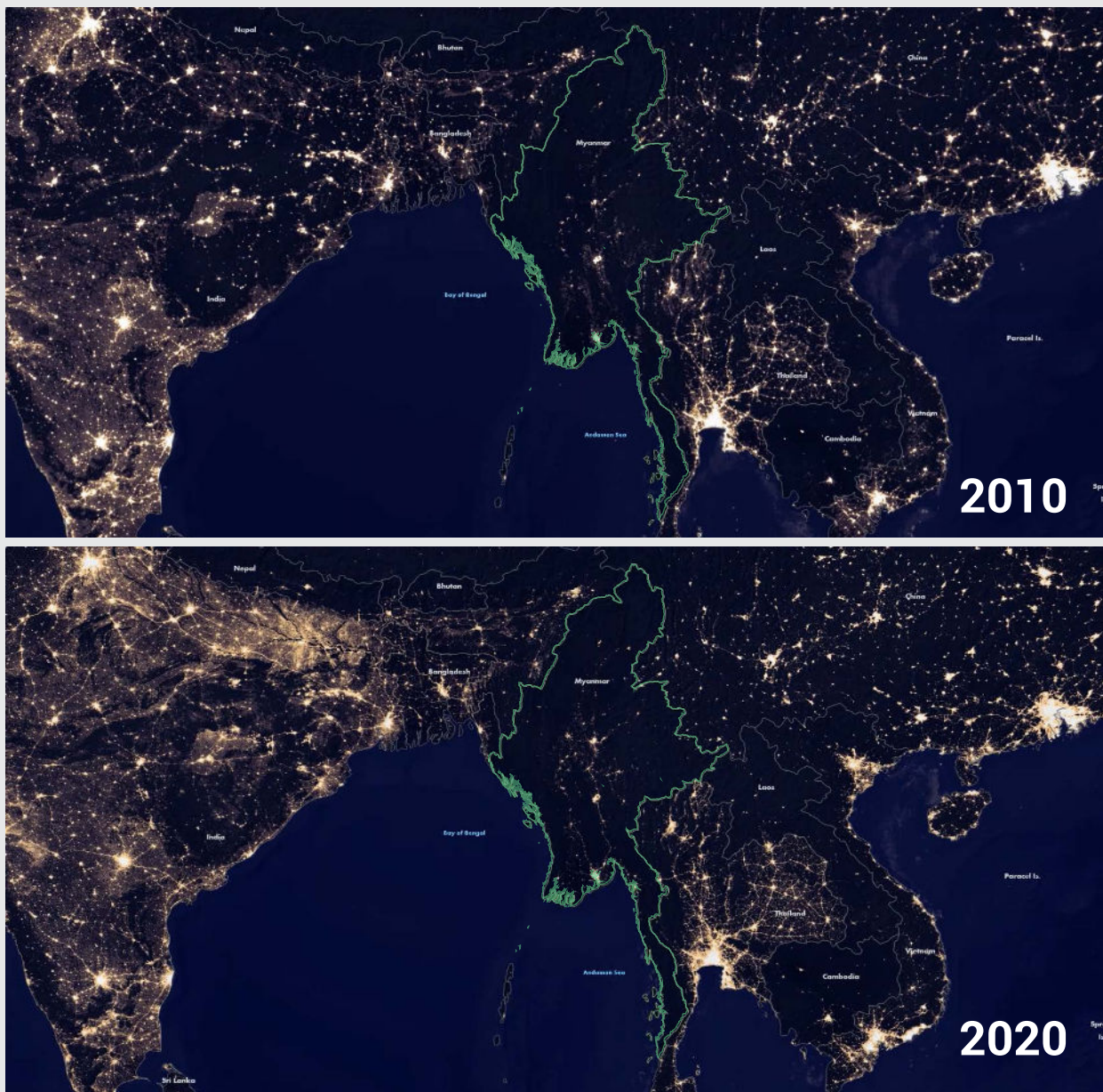
The introduction examines the background and context of electricity in Myanmar, drawing on secondary sources from the energy sector. Following this we explain the methodology employed to conduct primary research with households and small businesses. The findings are presented in the next section of the report and are divided into four subsections. In the first subsection, we explore the knowledge and understanding that electricity consumers have on the current electricity situation. The second subsection discusses the impacts experienced by consumers, followed by the third subsection which focuses on the solutions utilized by consumers. Lastly, the fourth and final subsection of findings delves deeper into how consumers assess their unique circumstances and decide between the solutions available. Finally, the report concludes by summarizing the key takeaways in the conclusion, followed by a set of recommendations based on the research findings.

## BACKGROUND & CONTEXT

### Policy Ambitions

While progress has been made in the last decade, Myanmar's electrification rate remains low compared to regional and global standards, and the country faces significant challenges in providing both reliable and widespread access to electricity. Myanmar's electrification increased from 25% in 2010/2011 to over 50% in 2019/2020.<sup>2</sup> Yet, this is still the lowest electrification rate among ASEAN countries and continues to be concentrated in major urban cities such as Yangon, Mandalay and Naypyitaw.

**FIGURE 1: Increasing electrification nationally 2010 - 2020<sup>3</sup>**



Source: MIMU

Myanmar set an ambitious goal of 100% electrification by 2030 under the National Electrification Plan. Since the start of political reforms in 2011, the government has prioritized energy sector development and worked to expand electricity generation and improve distribution networks. The Thein Sein and National League for Democracy (NLD) governments encouraged foreign investment in the sector, leading to the construction of new power plants and the rehabilitation of existing ones. A gradual expansion of the electricity grid brought power to underserved communities across the country.

In Myanmar the state has responsibility for electrical distribution and sets the price of electricity. In 2019 the Ministry of Electric Power (MoEP)<sup>4</sup> raised tariff prices to reduce the financial losses to the government from the growing gap between the revenues collected and the cost of generation. However, MoEP's financial situation has continued to be precarious with the introduction of an electricity subsidy from April 2020 to April 2021 under the Covid 19 Economic Relief Plan (CERP) and through widespread consumer electricity bill boycotts as part of opposition to the State Administration Council takeover. In addition to the financial challenges, civil service human resources have also been depleted throughout MoEP with many civil servants participating in the Civil Disobedience Movement (CDM) and over 4,000 staff estimated to have been dismissed.<sup>5</sup>

## **Rising Demand**

Electricity demand in Myanmar has grown with economic and social developments across the country. Prior to 2021, Myanmar was undergoing a period of rapid growth and economic transformation. The expanding manufacturing, construction, and service sectors required greater electricity to support their operations and meet the growing demand for goods and services. Population growth and urbanization further contributed to rising demand. As the grid expanded to more remote communities the demand for electricity rose. Finally, rising incomes and lower trade barriers increased demand for electrical appliances and modern amenities in the home and business. Daily tasks previously completed through other means now rely more heavily on modern electric appliances such as for cooking where in the period between 2014 and 2019 reliance on grid electricity as cooking fuel has increased in all districts of Yangon from 47% to 72%.<sup>6</sup> Peak load demand reached 3,878 megawatts (MW) in 2020, having grown at an average of 11% over the preceding five years. According to the World Bank, Yangon accounts for over 40% of the total electricity demand with only 20% of the generation capacity.

## **Contracting Supply**

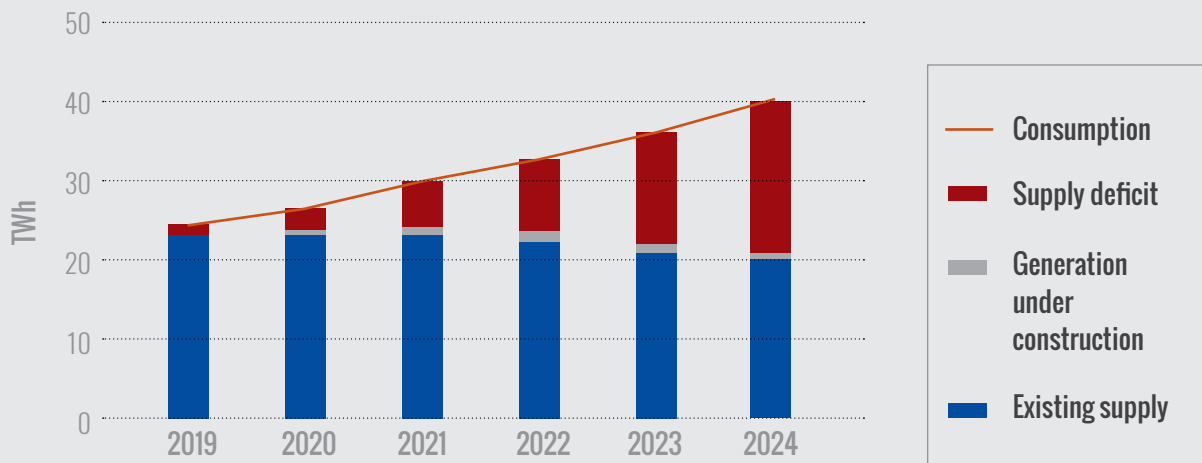
Myanmar's installed power capacity on the grid was estimated at 7,091 MW in 2020. This electricity supply is predominantly derived from natural gas (51%), with hydropower a close second (46%), with a minor reliance on coal and solar power plants.<sup>7</sup> However, the availability of electricity fluctuates due to seasonal variations and the availability of water for hydroelectric generation, which remains least expensive power source.

Generation of Electric Power decreased by 6.32% in the fourth quarter of 2022-2023 (Jan-Mar) 2022 compared with the second quarter of 2021-2022 (Jan-Mar 2021). Generation of Electric Power decreased by 16.63% in the fourth quarter of 2022-2023 (Jan-Mar 2023) compared with the third quarter of 2022-2023 (Oct-Dec 2022).<sup>8</sup> On December 31, 2022, total installed capacity reached 7,179 MW, whereas available capacity was 4,500 MW due to reduced gas generation, export of power to China, low precipitation reducing water reservoirs. Yet contracting electricity supply is also a product of persistent structural challenges, including the slow approval of new generation projects by MoEP, limited investment to improve the efficiency of existing power plants, aging infrastructure and insufficient investment in the high voltage transmission grid.<sup>9</sup>

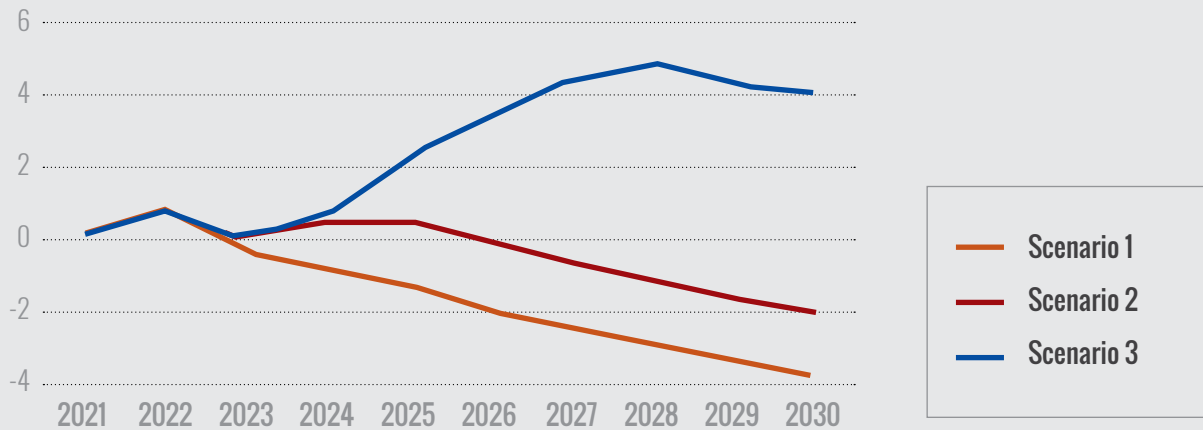
## The Growing Supply Deficit

In 2019 the World Bank estimated that the gap between overall electricity supply and demand would grow considerably over the coming years (Figure 2). The proposed projects under construction only met a fraction of the growing consumption needs. A weaker economic environment may slow demand growth, but the planned projects are not able to offset the contracting supply. Even if the sector was to receive massive investment, the production lags involved in tendering and building new energy projects imply there will be a significant electricity deficit for the foreseeable future (see Box 1). The problem is especially acute for Yangon, where the supply-demand imbalance is greater. The World Bank scenario modeling shows that even under the most optimistic scenario, scenario 3, Myanmar would not recover to its 2020 power generating capacity until 2024. Under the World Bank scenarios 1 and 2 the projected power supply capacity would remain close to the demand and soon fall short of the projected demand assuming the demand growth remains at the historical trend.<sup>10</sup>

**FIGURE 2: Forecasted supply–demand gap (as of 2019), World Bank staff estimates**



Source: The World Bank

**FIGURE 3: Projected supply-demand gap scenarios (GW), World Bank Staff estimates****BOX 2: Energy generation investment time lags**

Expanding electricity production typically requires large capital project investments that take years to move from an idea to an operational facility and electricity in the grid. For instance, the 225 MW Myingyan Gas-Fired Power Plant project was approved in 2016 and completed in 2022.<sup>11</sup> Construction times decrease with project size and solar projects can be quicker, with the 170 MW Minbu Solar Power Plant launched in February 2018 with power generating by June 2019.<sup>12</sup> However, in addition to construction it takes time for government identification and project approval, tendering of a suitable supplier, site preparation and community engagement, and contract negotiation. Over the last decade too few projects have been approved and developed relative to the ambitions of the National Electrification Plan. The supply deficit is now so large, and getting larger, that even if massive investments began immediately, it would take years to address the supply deficit. That degree of public or private investment is unfeasible given the current political and business environment and remains so under a range of alternative political and economic governance scenarios.<sup>13</sup>

**Demand Management Through Load Shedding**

Myanmar's reliance on seasonal hydropower means that a supply demand imbalance is an annual fixture. MoEP adopts load shedding to address supply deficits, with specific connections periodically and temporarily disconnected from the grid.<sup>14</sup> During the summer months in 2019 (March to June) load shedding reached approximately 300 MW at peak times.<sup>15</sup> In an apparent effort to reduce some of the disruption caused from unpredictable power outages for households and businesses the MoEP introduced a load shedding schedule in Yangon. This sets out specific times for power outages according to geographic groupings (see Box 2).

In 2022, increased unscheduled power cuts were reported as early as January with areas in Yangon experiencing on average four hours of power cuts during the day. This increased to an average of five hours by early March.<sup>16</sup> Scheduled load shedding was reintroduced in the summer months of 2022 and 2023 after a two-year break in 2020 and 2021.

While other demand management strategies could include increasing electricity tariffs in Yangon, it is currently considered unlikely. The MoEP employs load shedding as its principal demand management strategy to alleviate the strain on the overburdened electrical system. Global practices, such as tariff increases, or peak and off-peak pricing systems have not been implemented in Myanmar to reduce demand. Several factors make this approach improbable, including MoEP's historical practice of subsidizing tariffs, the potential political backlash that may arise from tariff hikes, and the limited effectiveness of such increases in curbing demand among households and small businesses, which already have relatively modest consumption rates.

Notably, there have been instances of elevated costs for large industries seeking continuous 24-hour power supply through the payment of additional fees. However, it's important to clarify that these tariff adjustments are not driven by a desire to reduce overall demand but are more opportunistic and ad hoc in application, reflecting unequal influence and an attempt to bolster larger industrial players. However, these options are not available to households and small businesses in Yangon.

### **BOX 3: Loading shedding schedules in Yangon**

In Yangon, the 2022 and 2023 March to May power cut schedule has operated on a four-hour rotation between the hours of 5am and 9pm. Wards are assigned to two groups; A or B; that rotate throughout the day. The schedule is issued on a monthly basis and details which group has power each day in four-hour blocks. Yangon Electricity Supply Corporation (YESC) shares photos of paper copies of the schedule through their social media communication channels.

Scheduled load shedding is not implemented in March 2023 between 5pm and 9pm, to assist students' preparation for exams through the final month of the public education system school year. And despite the schedule, power outages often occur at other times in the day and night because of unplanned load shedding or system breakdowns.

**FIGURE 4 : Sample schedule March 2022 and March 2023**

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၇	24.3.2022	✓	X	X	✓	✓	X	X	✓	✓	✓	✓		
၈	25.3.2022	X	✓	✓	X	X	✓	✓	X	✓	✓	✓		
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3	3/3/2023	A	A	A	
4	4/3/2023	A	A	A	
5	5/3/2023	A	A	A	
6	6/3/2023	A	A	A	
7	7/3/2023	A	A	A	
8	8/3/2023	A	A	A	
9	9/3/2023	A	A	A	
10	10/3/2023	A	A	A	
11	11/3/2023	A	A	A	
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26	26/3/2023	A	A	A	
27	27/3/2023	A	A	A	
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Source: Yangon Electricity Supply Corporation

## METHODOLOGY

This study used a mixed methods qualitative research approach that combined key informant interviews (KIIs), digital ethnography, and transect walks to gather a comprehensive understanding of the research topic. The integration of these methods allowed for a deeper exploration of the context and experiences of the participants. The research was conducted between April and May 2023 and research participants were selected through a networked approach due to ongoing contextual limitations that have constrained the research environment and reduced trust between strangers. The area studied for this research was Yangon, the commercial capital of Myanmar.

The research was conducted in three phases:

### Phase 1 - Transect walks

Researchers physically walked through specific routes in the study area, carefully observing and documenting the physical and social environment. They paid attention to the built environment, infrastructure, and community dynamics to understand their impact on the research topic. Transect walks were conducted in twelve YCDC townships and covered an average of 2 km per walk.

### Phase 2 - Key Informant Interviews (KIIs)

These interviews involved talking to individuals who had expert knowledge or firsthand experience related to the research topic. Open-ended questions were used to gather detailed information and diverse perspectives from the informants. A total of 40 KIIs were conducted with consumers of electricity; small businesses and households as well as experts and electronic goods suppliers.

### Phase 3 - Digital ethnography

This method involved observing and analyzing online communities, social media platforms, and other digital spaces relevant to the research topic. Data was collected from online discussions, forums, and social media posts, providing insights into people's attitudes, behaviors, and interactions in the digital realm. Approximately 100 Facebook groups were monitored for the digital ethnography through an initial search on Facebook using keywords including *solar*, *generator*, *power solutions*, and *electrical* and by reviewing related groups suggested by Facebook.

The data collected from the KIIs, digital ethnography, and transect walks were analyzed with NVIVO qualitative analysis software using thematic analysis. This involved identifying recurring themes, patterns, and relationships within the data. The findings from each method were triangulated to gain a comprehensive understanding of the research topic. Secondary sources were consulted to add context to the themes and insights as they emerged.

## LIMITATIONS

The findings of the research should be viewed with the following limitations in mind.

- **Methodological constraints:** This study utilized qualitative research methods only. While this provides rich descriptive information, it lacks numerical data precision and quantifiable metrics necessary for statistical analyses to measure specific relationships between variables.
- **Scope and generalizability:** The research focuses specifically on electricity disruptions in Yangon and does not capture the full experience of consumers across Yangon or the dynamics of other regions in Myanmar.
- **Political sensitivity:** Conducting research in Myanmar is challenging due to the political sensitivity. In May, Byu Har, a famous Myanmar rapper was arrested, with the reason cited being online criticism of the electricity cuts in Yangon.<sup>17</sup> This is indicative of the general environment in Myanmar to not speak out against the current situation and may have limited how interviewees discussed sensitive topics such as their knowledge and understanding of the situation and the impacts felt.
- **Access constraints:** Due to the difficult operating environment of Myanmar a networked sampling approach was used. This may have limited the diversity in respondents in relation to certain demographics, namely education and socio-economic background.

Despite these limitations, the research provides valuable insights into electricity disruptions in Yangon, Myanmar, serving as a basis for future investigations and informing efforts to enhance the resilience and reliability of the electricity sector.



# FINDINGS

This section of the report discusses the findings of primary research conducted with electricity consumers. First, the electricity consumers' perspectives of the situation based on their own knowledge and understanding is discussed, followed by an exploration of the impacts power shortages have on them. Finally, blockages to adoption are discussed in the context of what consumers must consider and balance when choosing solutions to implement.

## UNDERSTANDING POWER SHORTAGES FROM THE COMMUNITY PERSPECTIVE

Consumers view the power situation in three ways; seasonally, year on year, and the long-term. Most consumers understand the seasonal fluctuations that occur due to Myanmar's dependence on hydropower and as such believe that at the onset of the rainy season power supply will improve and disruptions will be minimal. In terms of considering if the situation will improve in the next year, almost all believe it will not, with many consumers expecting similar seasonal fluctuations to occur in 2024. The long-term outlook for the power situation is more challenging for consumers to consider as it depends on the political situation. They believe that under the current management the electricity situation will get worse, though one interviewee expressed hope that Russian expertise will improve it.

The public understands that electricity shortages have been an ongoing challenge facing Myanmar and attribute the current deepening of the crisis to political mismanagement. The main reasons that the power supply has deteriorated since 2021 were cited as: political instability, poor management, lack of prioritization by the SAC, inadequate budget, and a need to change the current energy generation mix. For a minority it is believed that YESC, commonly referred to by its previous name EPC, has the capacity to supply power to all of Yangon, however, authorities are choosing not to, though the reason for this is not elaborated on by respondents as the opinion is politically sensitive in nature. While the public possess reasonable knowledge about the current short-term electricity challenges, they lack clarity on the long-term outlook due to their intertwining of the current state of the energy sector with the political situation. Therefore, uncertainty in Myanmar's political landscape prevents consumers from effectively planning for the future with many adopting a wait and see attitude, accepting the inevitability of being inconvenienced from power shortages and an inertia when deciding to implement solutions.

Contributing to the intertwined notion of electricity and the current political situation is that for many the current power shortages are believed to be more severe than the period under NLD, but better when compared to before 2015. A factor that likely contributes to power shortages being improved when compared to pre 2015 is the introduction of monthly load shedding schedules in most townships in Yangon, though not always adhered to allow some level of planning and preparation to

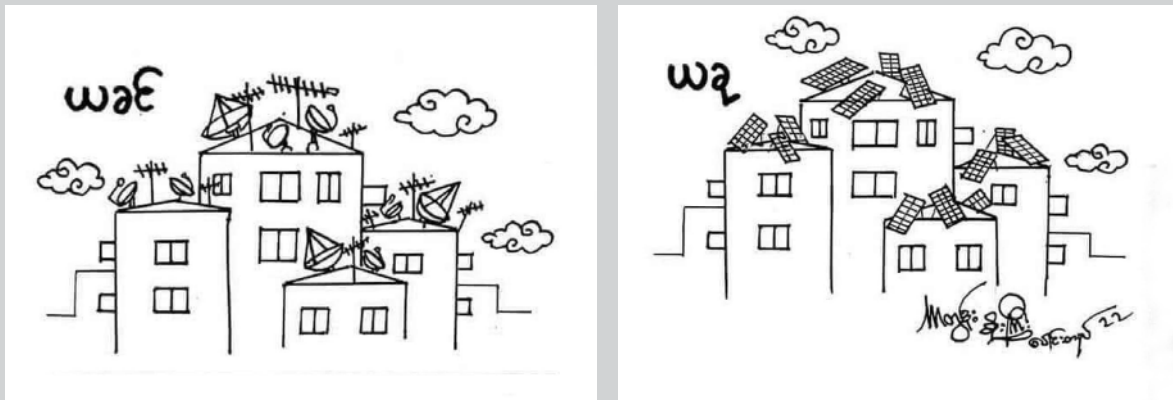
be employed by households and small businesses. Consumers are aware of the schedule and frame the situation in this way with many people opting to describe how the schedule operates or fails to operate when asked about the current situation. Frustration towards noncompliance with the schedule is high, especially for wards in townships located in the outskirts of YCDC, where some report no schedule is provided, or major deviations are common. Even for townships in central areas of Yangon, there are deviations from the schedule resulting in longer and unexpected power cuts at times.

“*When we are talking about electricity shortages, we should consider many indicators. My guess, it will be worse next year. If we implement renewable energy, the result will change in five years. I think Myanmar has already planned for renewable energy because electric cars have been imported. If Myanmar implements renewable energy, the power shortages will reduce. In the future, the world will face drought and high temperatures. Nowadays Myanmar relies on hydropower. If drought happens in future, we cannot totally rely on hydropower. If Myanmar implements renewable energy, the electricity shortage problem can be solved.*”

- Male English teacher, Thaketa

Social media is the main information source for people, with Facebook being commonly cited as a place for information. Official YESC Facebook pages, administered by each YESC township office, provide information about system faults and the official power schedule for each month. This information can be provided in an ad hoc manner depending on the township office with some being inactive for months or even years. It is clear from conversations that while YESC social media is cited as an information source, this is due to behavior adopted previously, when people ‘liked’ YESC Facebook pages, enabling posts by YESC to show in their newsfeeds. Now YESC communications via Facebook are more sporadic. From 2021 people are less likely to seek information from YESC via offices, Facebook Messenger or calls due to difficulties initially getting a response and then further challenges getting reliable information.

**FIGURE 5: Cartoon by a Myanmar cartoonist, circulated on Facebook in April 2023**



Source: digital ethnography, Facebook

Community groups on Facebook are also a common source of information regarding the electricity situation. Community groups are formed based on a shared interest or location and therefore provide information to members that is perceived to be reliable, from peers and trusted contacts. While social media provides a space for information seeking and consumption, it also, by the nature of social media, is used as a platform for discussing, mostly negatively, and sharing satirical observations on the general situation.

“*The information received from the community is more reliable and useful, it informs about which parts of the township are having power shortages and the cause.*”

- Male online business owner, Tamwe

For older generations or business owners who do not live on the premises information sources are person to person from family, friends, and staff, sometimes resulting in out-of-date information or information being shared after the fact.

“*I receive electricity information from family members, neighbors and Facebook groups. I can find information about the power on/off schedule and the reason for cutting power. Sometimes, my neighbor shares information through Facebook messenger.*”

- Female office employee, North Okkalapa

## IMPACTS OF ELECTRICITY SHORTAGES

Electricity shortages have far-reaching consequences for communities in Yangon affecting vital services, amenities, equipment, business strategies and daily activities. These immediate impacts have wider social and economic implications highlighting the urgent need for sustainable solutions to ensure reliable and accessible electricity for the community. This section examines the multifaceted impacts of electricity shortages, including immediate disruptions and the subsequent cascading effects on consumers in Yangon.

### Disruption of Vital Services, Daily Activities, and a Deterioration in Quality of Life

“*My house uses a gas stove for cooking. Laundry and water pumping must be done while having regular electricity.*”

- Female working from home, Insein

Load shedding and power cuts in Yangon result in the loss of electrical power to households and small businesses affecting lighting, cooking appliances, communication devices, cooling methods, water pumps and building amenities such as elevators. Businesses, especially in hospitality, food

service, personal care, trades, and consumer services sectors, face significant challenges when their appliances lose power. Moreover, electricity shortages lead to the removal of public amenities such as streetlights and traffic lights, impacting entire communities.

**“It mostly affects the working atmosphere, even though work can proceed using a laptop. I do not feel comfortable when there is poor light at my desk. I used to work late at night, but having no electricity at night affects this routine. When the working schedule is not consistent, it affects my deliverables and impacts the professional career.”**

- Female working from home, Insein

The disruption to vital services and amenities creates further impacts on the daily activities and the quality of life of individuals and businesses. Without electrical cooling appliances, such as fans and air conditioning units, people struggle to create a comfortable environment in Yangon's tropical monsoon climate. This lack of comfort affects well-being, work performance, sleep quality, particularly in crowded areas with limited airflow.

**“I could not sleep well due to the power cuts and cannot turn on the aircon at night. I live in a small apartment in Yangon [and] [t]here is no air circulation in my small apartment in hot weather. It makes [me feel] exhausted without the aircon. When I arrive at the office, I feel sleepy and cannot concentrate on work. My brain does not work properly.”**

- Female office worker, Thaketa

Access to electricity is crucial for meeting basic household needs, and the main caregiver, typically women, is significantly impacted. Cooking, water supply, and household chores suffer when electrical cooking appliances, water pumps, and other devices cannot be used. Water supply becomes a major concern during power shortages, with reports of housing complexes being left without water for days.<sup>18</sup>

Education, work, and entertainment are also heavily affected. Online education and remote work rely on electronic devices and stable power supply. Power cuts disrupt online meetings, workflow, and communication among colleagues. Businesses dependent on electricity struggle to provide consistent and quality services, impacting sectors like foodservice and personal care.

**“According to power cuts, I cannot order more than 1- or 2-days' worth of meat and fish. I cannot keep running generators all the time to freeze the meat and fish at the right temperature. It is not only a challenge for [my] shop but also for suppliers.”**

- Male, restaurant manager, Kamayut

Power cuts raise safety and security concerns at both the community and individual levels. The lack of lighting in streets poses personal safety risks, especially for vulnerable individuals walking at night. CCTV systems used to enhance security cannot operate without electricity, contributing to stress and a reduced sense of security. The irregular power supply and surges also strain electrical systems and devices in households and small businesses, compromising safety and functionality.

“**[My] main concern is safety when going outside. I do not feel safe when it is dark with poor lighting in the streets.**”

- Male online business owner, Tamwe

## Wider Social Impacts

The consequences of power shortages extend beyond immediate disruptions, leading to societal and economic implications. Elevated temperatures, inadequate sleeping conditions, and heightened stress levels result in poor physical and mental health outcomes. Working in high temperatures can cause health issues, while insufficient sleep and increased stress negatively affect mental health. The constant need to plan around power shortages adds to people's stress levels and affects their overall well-being.

“**There is no power almost every day after 10pm. Sometimes, the power comes back around midnight... Power cuts affect our sleep, we cannot sleep enough at night, but we have to work as usual during the daytime. Sometimes, all employees including myself suffer from headaches and are very dizzy during the working hours due to sleep deprivation.**”

- Female hairdresser and beautician, Kamayut

“**When the weather is very hot, there is a possibility of having a heat stroke [this] affects[s] children and elderly people. If there is electricity, this problem can be managed by air conditioning the room.**”

- Male graphic designer, North Dagon

Unreliable power supply affects the productivity of firms and learning outcomes for students relying on online education. Reduced productivity at the worker level and decreased output for businesses occur due to compromised environments, delayed communications, and disrupted workflow during prolonged power shortages. Power deficits and increased costs act as deterrents to business investments further constricting economic growth. Of firms nationally experiencing power outages 54% report them as disruptive in December 2022.<sup>19</sup> This is particularly true for manufacturing and service industries which are highly concentrated in Yangon. This number has likely increased as power outages have become more frequent and sustained. Power shortages also impact online education, potentially hindering future skill development among individuals.

**“Having no electricity at home, it affects the environment I use at home for working. It reduces my motivation in achieving my work.”**

- Male office worker, Kamayut

A major impact of electricity shortages is the financial impact households and small businesses experience. Small businesses experience increased operational costs for installing and operating alternative power solutions. Even those that have not or do not need to install a major power solution report a loss of income from reduced operational hours. Households are also impacted financially by increased costs for installing and using power solutions. Some households report that despite the power cuts their electricity bills are not reducing, adding to their frustration towards the situation. The financial impact on households and businesses from power cuts adds to the multitude of financial challenges facing Yangon residents.

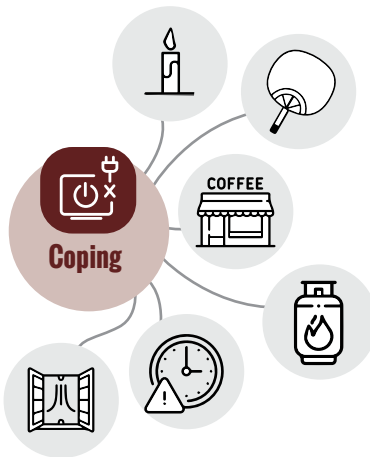
**“Due to having [power] shortages, unnecessary expenses have emerged; this means the production cost has increased by about 20%. We had planned to expand the [my wife's] tailoring business into a small-scale garment factory. But when I realized there is potential to have rising costs in production, I had to suspend the business plan.”**

- Male graphic designer, North Dagon

Furthermore, power shortages complicate community social dynamics and relationships. With some solutions to power shortages impacting the public environment, such as generators, individuals and small businesses must adapt their behavior due to concerns over complaints from neighbors. With consumers implementing solutions to power shortages that appease neighbors, social dynamics are impacted. Personal safety and security concerns during blackouts contribute to increased apprehension among community members. Both of these behaviors as a result of power shortages impact social cohesion, the strength of relationships and the sense of solidarity among members of a community, and strain community dynamics.

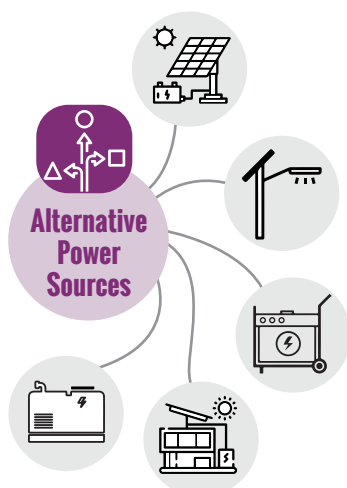
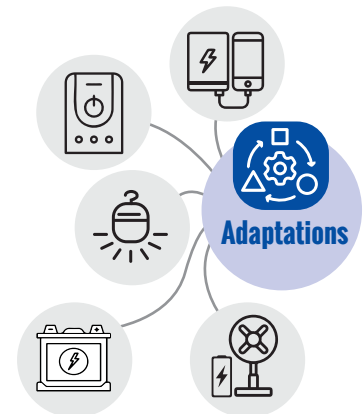
## SOLUTIONS

Households and small businesses respond to power shortages through a mixture of what we categorize as coping behaviors, adaptations and alternative power sources. This framework is summarized in the text and visual below, though a comprehensive description of solutions adopted within the framework is available as annex 1.



**Coping** behaviors are reactionary behaviors by consumers. They do not provide access to power in situ during power cuts and often require a change in typical behavior in order to overcome an impact of power cuts. Each coping behavior responds directly to a single impact rather than being able to overcome multiple things through one action. Coping behaviors are utilized by households more and implemented on an ad hoc basis by an individual. Examples include doing household chores when grid electricity is on; eating out or spending time in cafes and restaurants; using personal communication devices for work; sitting in the dark.

**Adaptations** are advanced planned changes in the equipment used by consumers in order to replace the need for electricity and/or store grid electricity for use during power cuts through battery power. They provide access to electrical goods in situ during power cuts and require investment and preparation in advance in order to overcome impacts of power cuts. Some adaptations respond directly to a single impact, while others can respond to multiple impacts through one action. Adaptations are used by both households and small businesses, examples include rechargeable appliances and lights, power banks, UPS, power stations and inverters and batteries.



**Alternative power sources** can be used independently of grid electricity through the generation of power using alternative energy sources. They provide access to power in situ during power cuts and require investment and preparation in advance to overcome impacts of power cuts. Most alternative power sources have the capabilities to respond to multiple impacts through the supply of power to multiple electric goods at once. Alternative power sources are employed by some households and can be essential to small businesses for continuity of operations. Examples include diesel and gasoline generators, solar powered appliances and power stations and building solar systems.

**FIGURE 6: Examples of coping behaviors, adaptations and alternative power being used in Yangon**



Source: transect walks and digital ethnography

## Navigating Solution Options; blockages and considerations for consumers

The primary challenges households and small businesses face around identifying and implementing solutions are financial constraints, their physical environment and finding solutions that meet their capacity needs. This section explains these challenges further and how they must assess their situation in relation to these constraints in order to implement solutions to power shortages. Consumers must combine a number of solutions within and across the framework to match the unique reality of their situation. From the outset consumers must balance key considerations while choosing between the options available to them. This requires complex information processing and deep understanding of their unique requirements and capabilities, often becoming an additional blockage for consumers.

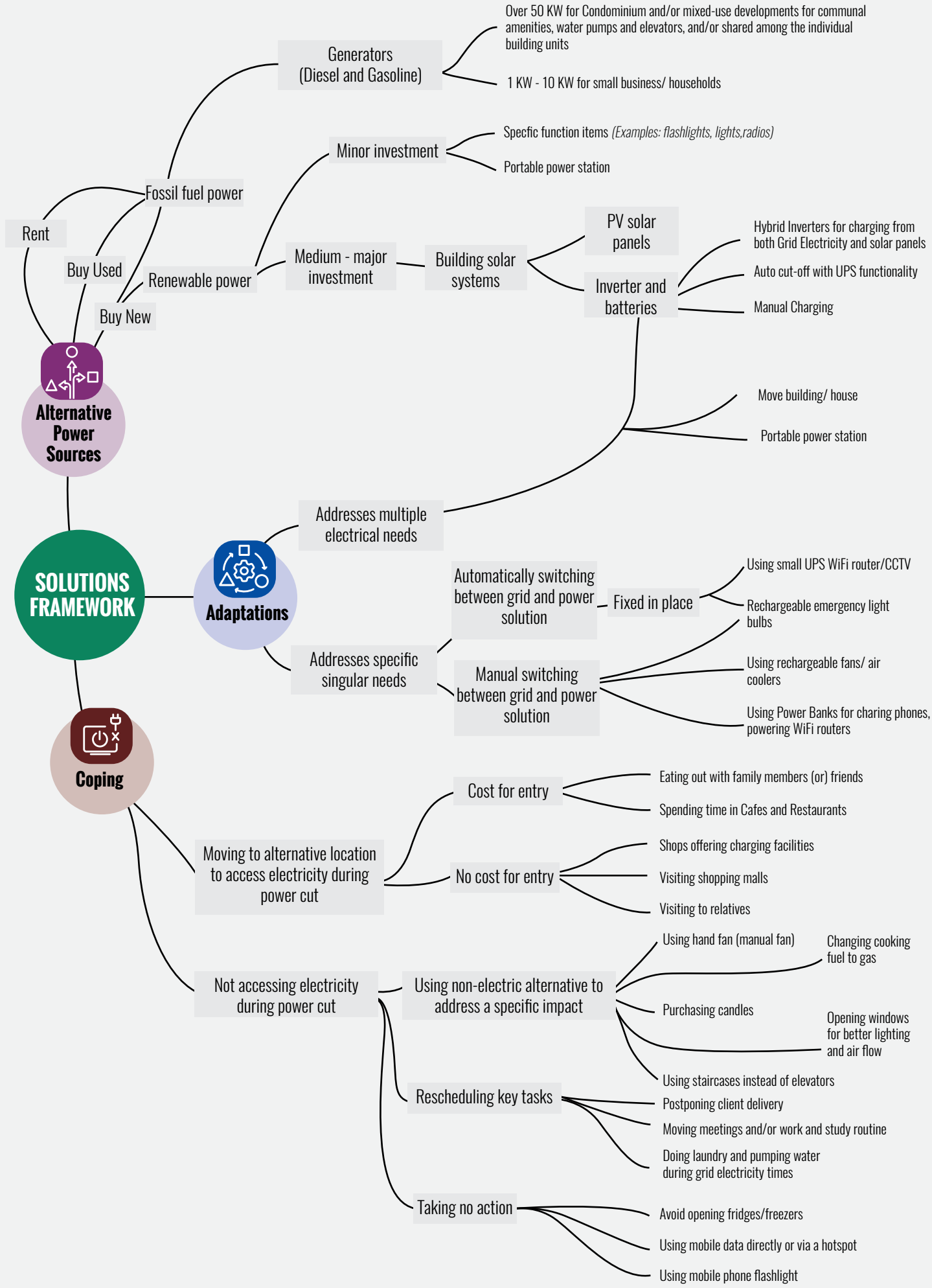
Consumers identify financial and the physical environment as barriers to adopting desired solutions and when faced with these barriers they are left with a multitude of options to navigate, often implementing solutions that fail in terms of addressing their needs. Consumers have to assess and reassess their situation in terms of their capacity requirements, financial abilities and their physical environment while navigating the implementation of solutions.

### Matching capacity needs

Regarding capacity, there are two distinct sub-categories to consider. Firstly, there is the capacity in terms of the quantity and variety of items that need to be powered during power outages. Secondly, there is the capacity in terms of the durability and recharge capability of the implemented solution.



# BOX 4: The Solutions Framework



The capacity of a solution also impacts the financial cost and space required for that solution. In the case of businesses, the nature of the business plays a significant role in this deliberation. For instance, establishments like restaurants and beauty salons rely heavily on electricity for their operations while retail businesses are comparatively less dependent. Even within businesses that have high electricity demands it can vary, for example restaurants require non interrupted supply to power fridges regardless of operating hours and customers for food storage, while beauty salons can operate with interrupted supply as electricity is only essential for productivity when customers are there. Households and small businesses typically select solutions based on the current state of power supply in Yangon and their current needs. Although many acknowledge the possibility of a deteriorating situation with more irregular power supply, which may necessitate higher-capacity solutions, their behaviors do not always reflect that awareness, likely due to financial blockages to adopting higher capacity solutions.

“*First I had to identify essential and non-essential use at home...decided that light points must be only 2 and for charging 2 points, so [the inverter] can last for 8 hours when there is no supply from EPC [YESC]*”

- Male office worker, South Dagon

“*The options I have currently chosen are not fully providing for my house's electricity requirement but considering other options like power generators would cost me with regular fuel expense and negotiating with neighbors for noise distraction in the surrounding area [I chose to install an inverter].*”

- Male graphic designer, North Dagon

### **Assessing financing options**

When it comes to financial considerations there are two sets of financial considerations: first initial investment and second ongoing operational and maintenance costs. There are no initial investment costs for coping behaviors, however for adaptations and alternative power sources there are, which can act as a barrier to consumers. These initial investment costs can be varied by the type of solution chosen and the capacity of that solution, with lower capacity solutions costing less than higher capacity ones. However, reducing costs in this way can bring further frustrations due to solutions inadequately meeting expectations and capacity needs, a frustration raised frequently by households and small businesses. For generators rising prices have been reported which will constrain the capacity and functionality of generators available for a given budget. Solar is perceived by consumers to be expensive because of the high investment required for installation as multiple parts are needed for the system to operate; an inverter, battery and photovoltaic (PV or solar) panels. However, there are instances where consumers have been able to stagger installation through investment of hybrid inverters first, or smaller and/or fewer photovoltaic (PV or solar) panels to offset the large upfront costs.

For some solutions there are ongoing operational costs associated with the use of the solution; for example, eating out requires payment for food at higher restaurant prices; generators require fuel; rechargeable devices require grid electricity use. These types of costs can be controlled by adjusting use or reliance on the solution. Maintenance costs are also an ongoing expense that are required for adaptations and alternative power sources especially those that require equipment and battery capabilities. Maintenance costs are often considered to be repairs and replacement; however, maintenance can be done more regularly at a small cost to pre-empt and avoid the need for larger one-off payments for major repairs and replacements. Additionally, products with warranties may be more expensive at the initial investment, but they can provide recourse to consumers if solutions break. Even without a warranty, businesses selling solutions to electricity are often willing to assist consumers if they can, especially neighborhood businesses.

“In my social circle, I used to give advice on how a house should calculate the consumption. Some friends reached out to me about how they should decide between battery or solar based on their budget and consumption.”

- Male designer, North Dagon

**FIGURE 7: Negotiating community dynamics for shared public space**



Source: transect walks

### **Considering fit within the physical environment**

The physical environment of the household or small business influences how solutions are implemented by consumers especially in relation to inverter and battery adaptation and alternative power sources. Physical environment encompasses both the public space and private space and the impact the solution may have on it, by reducing physical space or by noise and air pollution. Where private space is limited community dynamics become a factor, in that, neighbors must be considered to decide what communal public spaces are available and what disruption is reasonable to neighbors at different times of the day.

When considering a generator, for instance, a consumer must assess the feasibility and social consequences of the noise and air pollution and the disruption to pedestrians from placement on the street. Downtown Yangon sidewalks and streets are filled with generators, large permanent ones and small portable ones, the latter of which require both private and public space for storage and use respectively. Security is also a factor that must be considered if utilizing public space as access is shared, making it harder to protect against mistreatment or use by others. For some small businesses, vandalism resulted in cut wires between their shop and the generator, requiring repairs and additional safety steps to be taken.

For solar, access to sunlight is needed in order to harvest solar energy, this can be impacted by tightly packed buildings and lack of roof access. While many living in apartments believe solar is only an option for those in houses, through observation it is clear that smaller solar PV panels have been attached to sunshades and on frames extending from the building to overcome the physical environment blockage experienced by those living in densely populated urban centers. Batteries and inverters need to be stored indoors and therefore require private physical space, that is suitable in terms of structure and environment, for the storage of such equipment. If inadequate space is available indoors the size of the battery may need to be adjusted impacting costs.

### **Collating information to inform the decision**

Balancing these considerations is an important first step in identifying the solutions available to one's specific situation. Knowledge, however, then presents itself as a blockage for consumers. While consumers understand the options available to them at a surface level, deeper knowledge of the specifics of a solution is often not understood, or assumptions are made about the unsuitability of a solution for a households or business. For example, many of those living in apartments in Yangon believe solar power is not suitable due to the lack of access to a roof, however, some households have utilized their balconies and sunshades as a surface to place photovoltaic (PV or solar) panels. Similarly, small businesses may assume that use of generators will negatively impact neighbors with exhaust and noise, however, careful placement of generators, choice of casing and the addition of a longer exhaust pipes mean neighbors do not need to be severely impacted.

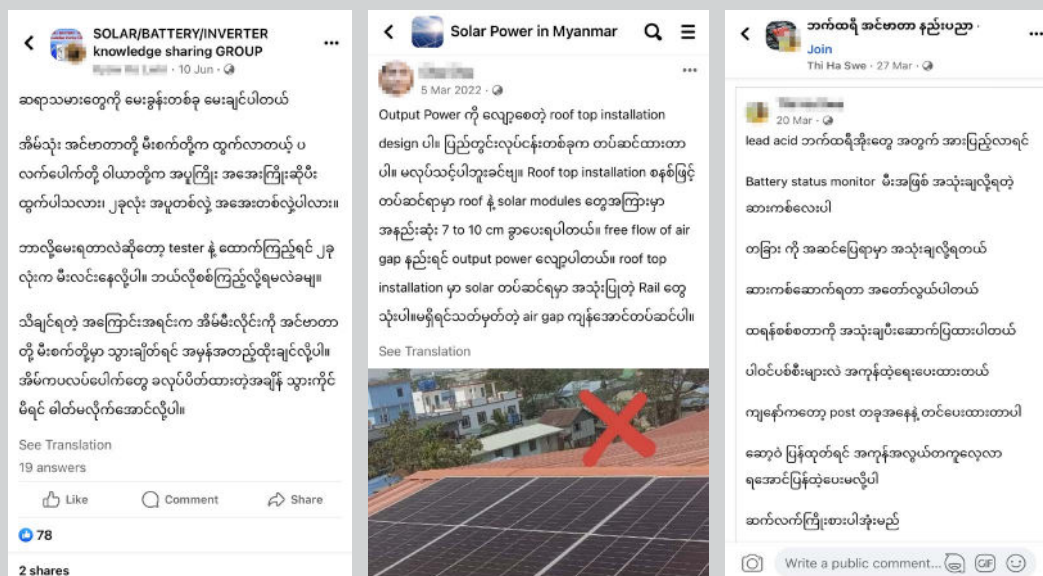
Once a solution is chosen, many consumers have limited technical knowledge and struggle to understand specifications and requirements, especially for new technologies such as solar. Crowded

marketplaces in terms of brands and models can also cause difficulty for consumers. Some consumers have been able to overcome these challenges by collecting information through discussions with friends, family or trusted contacts who are engineers or work in the sector. This is an inequitable information source favoring those lucky enough to have such networks.

Social media is a major source of information for consumers also. Over 100 Facebook groups were identified that host discussions and support the trade of adaptations and alternative power solutions in Burmese. Such groups have major engagement with members selling and buying, seeking advice, sharing information, and answering questions from other members, with an average of 25 posts per day. These Facebook groups have 24,000 members on average with the highest number of members reaching 200,000 in a group relating to solar with the description; *"Here we connect the sellers, buyers, installers and repairers together and also educate customers on common solar inverter system basic knowledge"*. The groups were created as early as 2015, though over a third were established in 2022 and 2023. Social media is a more equitable information source as groups are more open and each group can connect with more people.

However, the value of groups can be negatively impacted when there is an excess of posts that are seller driven content, with product advertisements and promotions. Their prevalence significantly affects the information shared among members. As promotional posts become more dominant, it can be challenging to find non-commercial content such as genuine discussions, helpful advice, or unbiased opinions. The influx of sales-oriented posts may discourage some group members from seeking a more authentic community experience. There is a need to ensure that community Facebook groups remain spaces for peer-to-peer learning and discussion and do not become cluttered marketplaces of seller-driven content.

**FIGURE 8: Sample Facebook post seeking and providing advice**



Source: digital ethnography

# CASE STUDIES

The following case studies bring the findings discussed to light through real examples. The case studies explore the impacts and challenges faced by people and businesses, as well as how they have had to combine coping behaviors, adaptations, and alternative power sources to meet their own unique circumstances. An additional case studies can be found in Annex 2.



Hi, I am Nang Khin Myat!

Nang Khin Myat<sup>20</sup> comes from a multi generational home, like so many in Yangon she needs to use a combination of solutions to meet her needs. However even with this combination it is not sufficient. She has also tried various options that were blocked by safety concerns and financial challenges one of the most common reasons people are unable to implement solutions to mitigate the impact of electricity shortages.

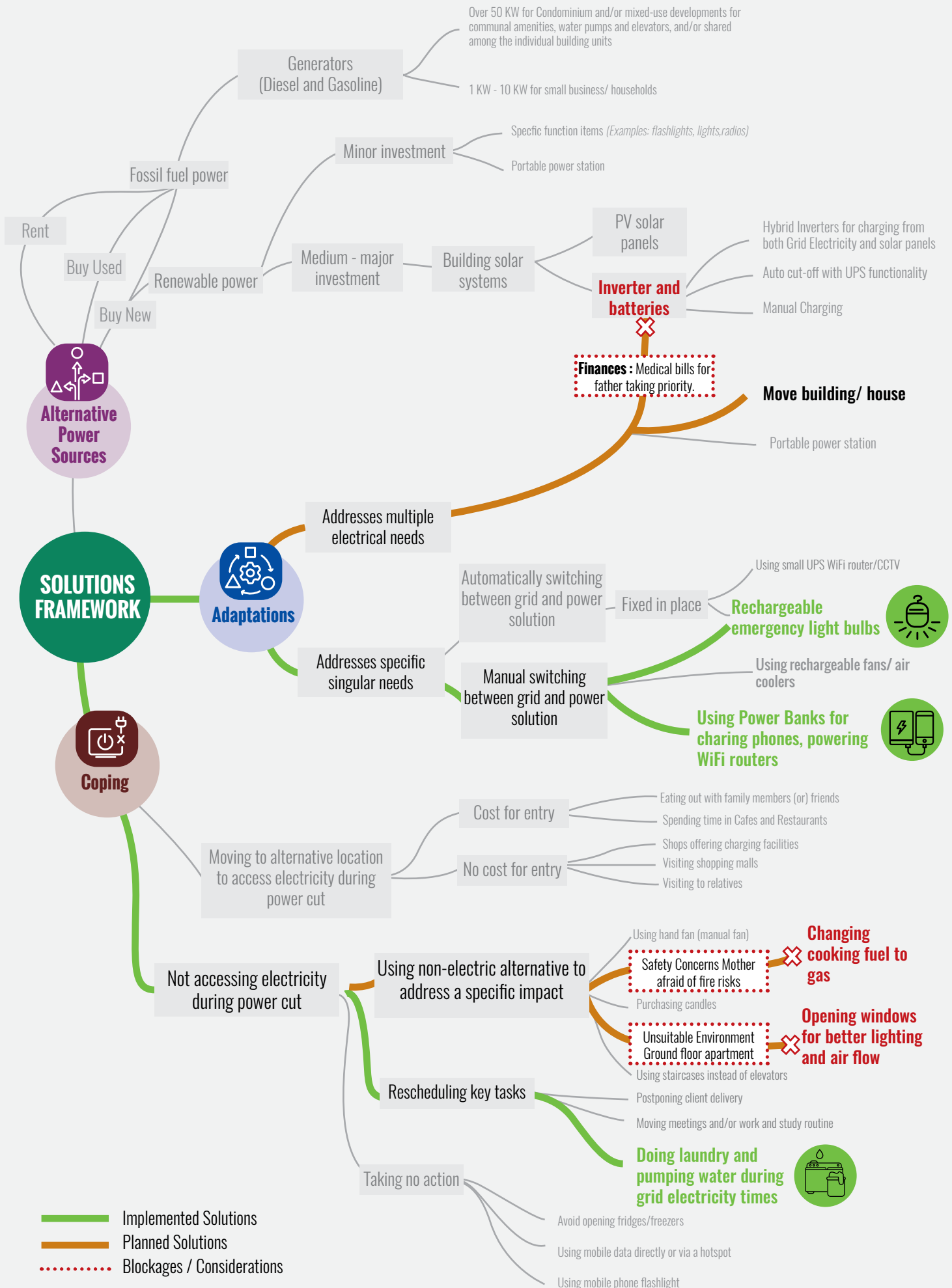
Nang Khin Myat, is the youngest member of a family residing in a ground floor apartment in Yangon. As a student, Nang Khin Myat experiences difficulties studying at night without electricity, and the lack of air circulation in the apartment affects her ability to sleep. The lack of a fan exacerbates the discomfort during sleepless nights. She has adopted coping behaviors and adaptations to enhance her study environment and fulfil her household responsibilities, though she finds it frustrating to grapple with these circumstances in the modern era.

## **Coping behaviors and adaptations:**

Living in an old building, Nang Khin Myat's ground floor apartment suffers from inadequate natural light and poor ventilation, as a result her family is planning to move to a higher-floor apartment. As a student, Nang Khin Myat encounters obstacles when studying during power outages. In an effort to compensate for the lack of lighting, she has resorted to using candles and rechargeable light bulbs, although they are not optimal for extended periods of reading.

Due to her father's illness and her mother's caregiving duties, Nang Khin Myat is responsible for managing household chores. Cooking, laundry, and water pumping must be completed during periods of electricity availability. The family avoids using gas for cooking because of safety concerns, and Nang Khin Myat must schedule her studies around power cuts to ensure she can fulfil her

**FIGURE 9: Nang Khin Myat's journey to mitigate the impacts of power cuts**



- Implemented Solutions
- Planned Solutions
- ⋯ Blockages / Considerations

household obligations. Power cuts occur every four hours in Yangon, and she relies on the sound of her neighbors' water pump to determine whether she can pump water during the day. Fortunately, she has the advantage of being able to access water during daytime hours, unlike some of her friends who face the challenge of having to wait to pump water at nighttime.

To alleviate some challenges, Nang Khin Myat's elder sister purchased a power bank for the Wi-Fi router, and she purchased rechargeable light bulbs from the local market. The availability of multiple vendors made the purchase convenient, requiring minimal research and financial investment.

### **Future considerations:**

Nang Khin Myat has identified that an inverter would be beneficial for the households, especially given her father's illness and mental well-being. But she recognizes the financial strain caused by her father's medical expenses and feels that installing an inverter to address the lack of consistent power is beyond their means. As a student with an irregular income, she does not want to burden her elder sister, who shoulders the responsibility of their father's medical costs.

### **Conclusion:**

Nang Khin Myat's case study sheds light on the daily challenges individuals face with frequent power cuts. Despite financial limitations Nang Khin Myat has demonstrated coping behaviors and made adaptations to address some of the immediate priorities of the family. Her story shows how a more flexible activity schedule is valuable and how small interventions can help to mitigate immediate the impacts of power shortages, but still leave people frustrated.



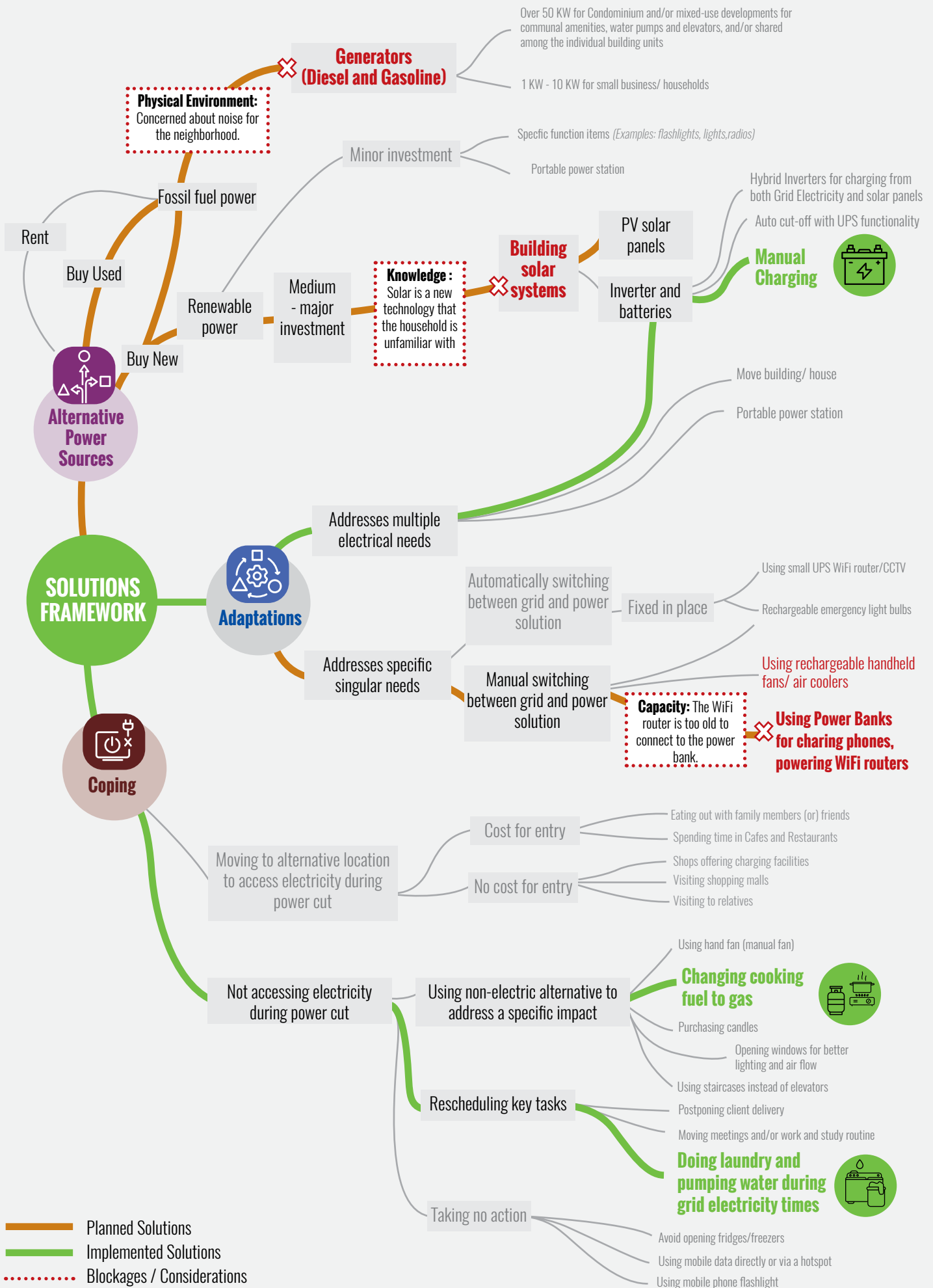
Hi, I am Thet San!

Thet San<sup>21</sup> lives with her five family members in a house in Yangon. The lack of electricity is an inconvenience for her and causes her discomfort. She has considered solar as an alternative power source but is blocked by a lack of knowledge to implement it and her family do not want a generator due to noise. Therefore the household relies on coping and adaptations behaviors. Really Thet san would like 24 hour grid electricity by paying for both the A and B schedule but has not been allowed to connect the household to both lines.

Thet San, lives in a household of five in a house with land in Yangon. She is pessimistic about the state of electricity for Yangon, believing that if the current management by the State Administration Council (SAC) continues, electricity supply will worsen in both the short term (1 year) and the long



**FIGURE 10 : Thet San's journey to mitigate the impacts of power cuts**



term (5 years). This negative outlook is attributed to factors such as reduced national budget allocations, declining natural gas production, and the impact of climate change on hydropower generation.

Thet San and her household experience frequent unscheduled power cuts at night, varying between 5:00 pm and 8:00 pm. This unpredictability impacts the daily lives and routines of the household. They face difficulties in cooking, sleeping in the heat, and focusing on work. The power cuts also affect safety and security as they rely on dogs to alert them to potential intruders. Last year the household experienced challenges but this year the household has access to water regularly, which is an improvement.

### **Coping behaviors and adaptations:**

To cope with power cuts, the household has adopted several coping and adaptation strategies. They wake up early to cook when electricity is available, sometimes 2:00 or 3:00 am) because they need to bring lunch box to the office. The household uses both charcoal and gas stoves, with charcoal favored during daytime power cuts. A rice cooker is always used and can only be used when there is grid electricity. A 300 W inverter and battery system were installed for lighting and Wi-Fi. Previously the household tried to use a power bank for the Wi-Fi however, their router was too old and would not connect. When purchasing the inverter and battery Thet San's brother helped as he was knowledgeable about the products and could help them decide.

The household incurs additional costs due to power cuts. They use charcoal and gas for cooking, with rising gas prices causing financial strain. These additional costs, including fuel and inverter use, are a burden on their finances. During power cuts, Thet San worries about damage to appliances such as air conditioners, refrigerators, rice cookers, and water pumps. She also fears forgetting to switch off the charging of the inverter battery which would damage the inverter and lead to further disruptions in their daily life.

### **Other considerations:**

Thet San and her family would prefer to have 24-hour power via the grid and what to pay for 24-hour power with a connection to both grid electricity schedules A and B. The house is happy to pay for this service and the units used however were refused when they inquired with the local EPC. They have also considered purchasing a generator but are concerned about the noise. They are not interested in solar energy due to lack of familiarity with the new technology.

### **Conclusion:**

This case study illustrates the challenges faced by households in Myanmar due to unpredictable electricity supply. Thet San's household has adapted to this situation by adopting various coping and adaptation strategies. However, they remain concerned about the future of electricity supply and lack the knowledge to implement renewable alternative power solutions. This case study highlights the need for better information sources for consumers to improve decision making and the uptake of sustainable power solutions.



Hi, I am Ko Win!

**Ko Win<sup>22</sup> manages an ice-cream shop. Having chosen a mix of coping and alternative power sources solutions he has been able to mitigate some of the negative impacts of the electricity shortages. He and the owner rely on coping behaviors initially during power cuts and then switch to alternative power solutions after one hour before the freezer temperatures drop too low. As a manager Ko Win finds it difficult to procure fuel for the generator adding stress to his managerial role and responsibilities.**

This case study focuses on Ko Win, the manager of one branch of Ko Naing's ice cream business in Yangon. With a heavy reliance on electricity to keep the fridges and freezers running, Ko Win faces the challenge of power shortages and the need for a reliable alternative power source. This case study explores how he manages the shop during power cuts and the considerations that shaped their choice of power backup solutions.

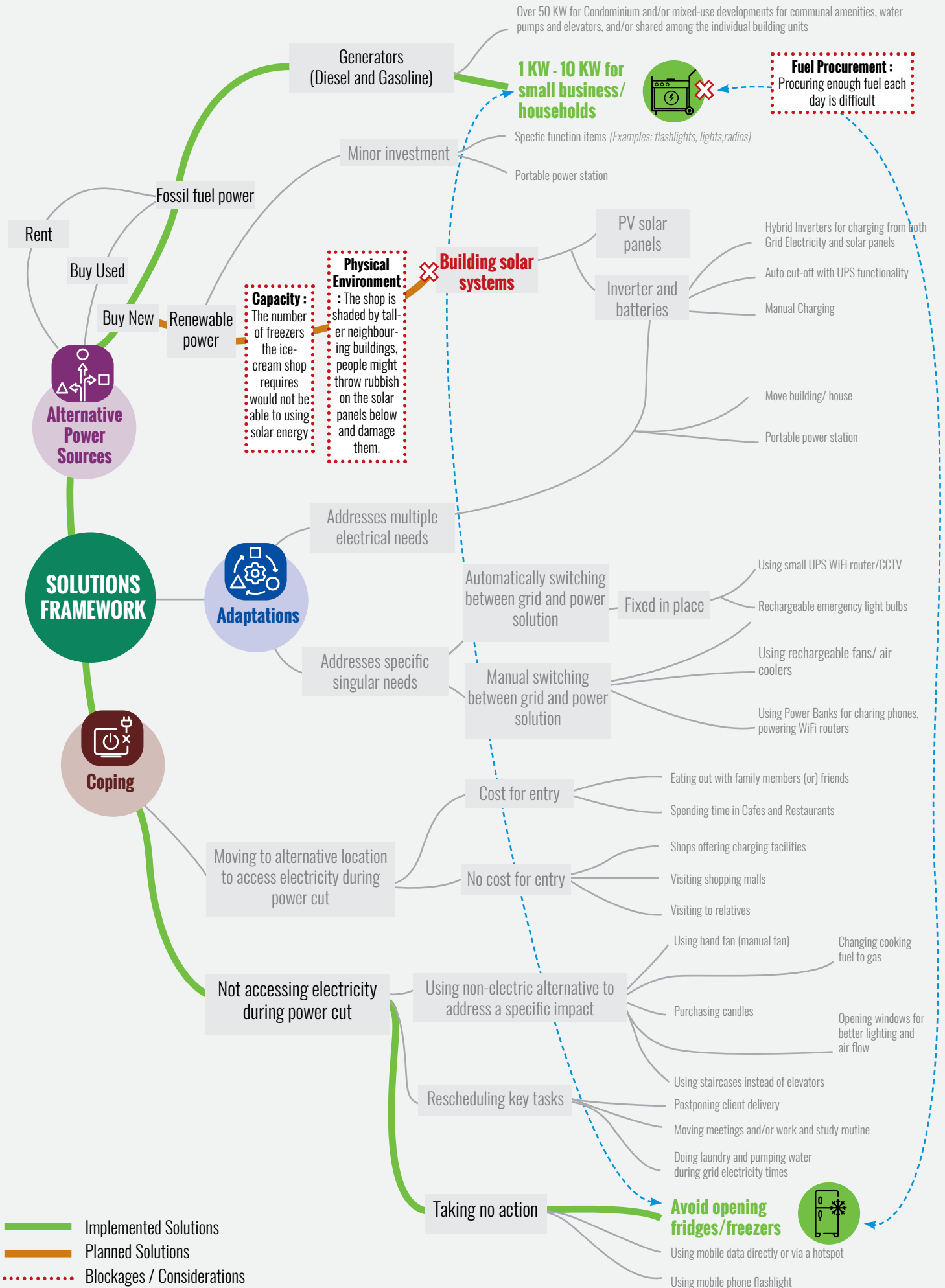
#### **Alternative Power Source:**

During the shop's renovation, the owner, Ko Naing, installed a generator in front of the premises to ensure a consistent power supply. The generator is crucial for maintaining the cold temperature required for storing ice cream products. To prevent theft, the generator's wires have been secured in concrete, a precautionary measure taken after an incident where the wires were cut during a power cut. Additionally, to safeguard the shop's inventory, one employee sleeps on-site to ensure the generator is turned on promptly in the event of a nighttime power cut.

To control costs, Ko Win and the owner have devised a power management strategy. During the scheduled four-hour power cuts, the generator is operated for a specific duration. Ko Win waits for one hour after the power cut before turning on the generator, runs it for two hours, and then turns it off for the remaining hour. This approach helps optimize fuel consumption while ensuring that the ice creams remains preserved. All employees are trained to operate the generator according to this plan. When the generator is not running and there is no power supply, the ice cream machines are temporarily inactive and require approximately 15 minutes to restart once power is restored. Despite this inconvenience, Ko Win finds the situation manageable.

While the generator effectively meets the business requirements, Ko Win acknowledges the financial implications of its operation and maintenance. The daily fuel requirement for the generator amounts to approximately 70,000 MMK every two days during April. To ensure an uninterrupted supply, Ko Win aims to purchase larger quantities of fuel as both actual usage and backup reserves. However,

Figure 11: Ko Win's journey to mitigate the impacts of power cuts



procuring the desired amount of fuel proves challenging due to limited availability at times. In addition to fuel costs, regular maintenance expenses include coolant changes every three months, engine oil top-ups and changes every six months, and occasional servicing fees. These costs impact on the business's profitability.

### Consideration of Adaptations:

Although inverters or solar power may be viable alternatives for some people, Ko Win deems them unsuitable for their particular business due to load requirements and the physical environment of the shop. The shop's low building height, coupled with taller apartments nearby, raises concerns about potential damage to solar panels from people throwing rubbish into the shop's roof.

### Conclusion:

Ko Win's experience highlights the operational challenges faced by businesses during power shortages. Through careful management and a power backup strategy, they have successfully maintained their operations during power cuts. However, the costs associated with fuel consumption and generator maintenance pose financial challenges. While alternative solutions like inverters or solar power are considered, the specific requirements and physical environment of the shop make them less feasible options. Ko Win's case study emphasizes the need for tailored and practical solutions to address power shortages in businesses, taking into account their unique circumstances and constraints.



# CONCLUSION

**A growing body of evidence points to an accelerating deterioration in access to reliable grid electricity across Myanmar.** Forecasts predict a continued gap between energy supply and demand in the future, across a range of economic and political scenarios. Due to the time, it takes for new electricity projects to get planned, approved and constructed, the current electricity disruptions are likely to persist or deteriorate for years. The problem is especially acute in Yangon.

**While Yangon's consumers understand the annual and seasonal availability of electricity in their city, very few feel they can consider the long-term outlook of the energy sector when implementing a solution to power outages.** There is thus a need to inform consumers of the long-term nature of the power crisis in Myanmar to encourage sustainable behaviors in this area. One of the key reasons consumers struggle to adopt a long-term perspective is the intertwined relationship between electricity access, political instability, and energy sector development.

**Power outages restrict access to basic amenities and appliances, creating challenges in the working and business environment, daily activities, and overall well-being.** The research documents extensive indirect secondary effects on health, business productivity, worker output, businesses investment, and community dynamics.

**While consumers have always navigated power shortages in Yangon, it is an evolving situation that continues to bring new opportunities and challenges.** Expectations have shifted, reliance on electrical goods increased and new and more technology is now available in the market. There is a crowded market for potential solutions and while consumers benefit from greater choice, they face a more complicated set of decisions.

**There are no singular magic solutions available to consumers.** Consumers in Yangon adopt mixed combinations of solutions that can be categorized as coping behaviors, adaptations and alternative power sources. A combination is needed due to financial limitations and constraints in the physical environment.

**While these circumstances are unique to each consumer there are lessons available that can guide consumers through their choices and implementation.** The research documents many examples of how consumers have learnt and implemented solutions to meet their unique circumstances.

**The key blockages consumers face when trying to implement a solution to power cuts are financial, their physical environment, inability to meet their capacity needs and a complex information environment.** There is a high financial burden to implement, operate and maintain alternative power solutions and some adaptations, that can support multiple electric needs, such as building solar systems, inverters and batteries or generators. While cheaper solutions are available, the constricting

economy means even investment in coping and adaptations strategies can be beyond a household's ability, especially if the household wishes to meet multiple needs. The physical environment of households and small businesses limit the options available to them, while some have been able to overcome these blockages, knowledge, creativity and good community relationships are needed to manage dynamics and be able to implement many solutions.

**Consumers seek guidance from peers who are technical experts and through online social media; these platforms are an opportunity to support adaptations at scale.** Peer experts are a good source of technical knowledge; however, access is inequitable and relies on individual networks connections. Social media sources are more open and equitable, with some relevant electricity Facebook page's, having over 100,000 members. However, the pages can become dominated by promotional material from sellers and consumers have to decode biased and out of date information.

**A better environment for information seeking, learning and sharing could help consumers implement the solutions available to them.** With consumer knowledge and understanding being anchored in the short term the research identified the risk that solutions being implemented are inadequately meeting current needs and not accounting for the possibility of long-term deterioration in electricity supply in Yangon. Ultimately, the research identifies cause for hope from the remarkable creativity Yangon consumers deploy to address electricity disruptions, and through their willingness to guide others struggling to navigate the solutions.

## RECOMMENDATIONS FOR DEVELOPMENT PARTNERS

- 1. Support consumer education and awareness:** Facilitate information campaigns and awareness programs to educate consumers about the possibilities and how best to select and implement solutions. Focus on providing accurate and reliable information through various channels, including social media platforms like existing Facebook groups and communities, which are widely used in the community.
- 2. Foster information sharing and peer-to-peer support:** Invest in current platforms and networks that facilitate information sharing and peer-to-peer support among households and small businesses for implementing a solution from purchase, operation, and maintenance, especially for alternative power sources. This includes online communities, workshops, and forums where individuals can exchange experiences, best practices, and recommendations for coping with power shortages effectively.
- 3. Encourage the development of interdisciplinary innovative solutions:** Work with a diverse group of stakeholders to develop solutions that reduce electricity demand and ease negative impacts of power outages for households and small businesses. Stakeholders could include but are not limited to urban design specialists, climate change advocates, community engagement

consultants, energy experts, electrical engineers, human centered design practitioners, gender specialists and business advisors.

4. **Facilitate access to reliable and affordable energy solutions:** Work with local stakeholders to provide financial support, such as microfinance or low-interest loans, to households and small businesses, enabling them to invest in reliable and affordable energy solutions. This can include directly supporting the import of good quality, affordable electrical products by organizations to be made available for people (either at market price or at subsidized price for different communities).
5. **Support capacity building and technical training:** Collaborate with local organizations and vocational training institutions to provide capacity building and technical training programs for suppliers and consumers. This is especially important for newer technologies in the marketplace. This can enhance their knowledge and skills in installing, maintaining, and operating energy solutions, empowering them to be self-reliant and better equipped to manage power shortages. This will also improve the reliability and quality of services for solutions in the market. Support should focus on environmentally friendly, new technology where knowledge is lowest, such as solar systems, but also include new products that have entered the battery, inverter, and other solution markets.
6. **Establish business support programs:** Develop targeted support programs for small businesses affected by power shortages. This can include financial planning assistance, business planning guidance, that accounts for the reduced access to power in Yangon, and financial and knowledge support for accessing to backup power solutions or shared energy infrastructure. Such programs can help businesses maintain operations, mitigate losses, and adapt to the challenges posed by power shortages.
7. **Conduct research and pilot projects:** Invest in research pilot projects to explore innovative and context-specific solutions for households and small businesses in Yangon. This can involve.
  - a. Testing new technologies.
  - b. Testing new business models, such as providing market linkage between foreign suppliers and domestic businesses that are importing and distributing electrical products and facilitating financial support programs for businesses addressing electricity problems.
  - c. Testing community-driven collective action initiatives to address power shortages effectively and sustainably.



# ANNEX

## 1. SOLUTIONS FRAMEWORK; DISCUSSION AND EXAMPLES

### Coping Behaviors

For households and small businesses coping behaviors involve adjusting one's typical routine and/or implementing non-electric solutions, such as opening windows to improve air flow in the house, climbing apartment stairs instead of using elevators, using hand fans, sitting in the dark or refraining from opening fridges and freezers to keep food cool. High electricity demand for tasks, including laundry, cooking, and pumping water must be planned to be completed during the available hours of grid electricity supply. During periods of power outages some activities shift outside the dwelling. For instance, going out to eat, going to cafes or spaces that have electricity to complete work or other tasks that require power, staying in hotels, using public spaces such as malls or visiting friends and relatives' houses. For businesses, it is harder for activities to shift outside the dwelling and therefore many cannot avail themselves of coping behaviors to the same extent as households. In April, when power shortages were at their worst, shops offered charging facilities and people donated access to electricity for those in need. The utilization of such coping behaviors is facilitated by people and businesses with grid electricity and alternative power sources.

Another common coping behavior for households and small businesses is the replacement of the need for electricity with an alternative method. For cooking, gas and less commonly charcoal is used during periods of power cuts. Candles are also mentioned as a replacement source of light in some households during power cuts. These methods, however, are not commonly used by those interviewed for this study, especially as they are a fire hazard.

Challenges arise with coping behaviors. First and foremost is the challenge that these do not provide a replacement for the power that has been cut within a person's own space and requires reactionary behaviors that are disruptive throughout the day or simply not available to people due to limitations on their time or finances. While coping behaviors can mitigate power cut impacts there are instances where these solutions bring about additional problems and exacerbate current challenges. Planning and preparation are required to ensure chores that have high electricity demand are completed when grid electricity is available. This often requires waking up earlier than normal for those with fixed schedules due to work and daytime commitments, further disrupting sleep. Non-electric solutions often bring additional challenges and require a complete reduction of electrical use during the power cut period.

For those applying coping strategies in a work or education environment at home; postponing deadlines, meetings and classes through negotiations with students, colleagues and supervisors at the time of power cuts, switching to personal electronic devices, or using mobile data directly or via

a hotspot are also utilized. Using mobile devices can impact the strain on eyes, especially for young children while the postponement or changing of classes and/or work commitments as coping behaviors require negotiating with and the flexibility of others.

## Adaptations

Adaptations involve the use of rechargeable battery power to supply electricity during power cuts. These include items that are for specific needs such as rechargeable cooling devices and lights as well as small (UPS, power stations and power banks) to large (inverter systems and batteries) capacity items that can be used for one or multiple electric needs. Adaptations are popular in Yangon, as many areas of the city receive power at reasonable intervals throughout the day via a schedule enabling households and businesses to rely on grid electricity to charge batteries. However, non-automatically recharging devices can be difficult if the consumer is not at their premises during periods of grid electricity. Batteries should not be left charging for long periods of time for safety reasons, as well as for the care and maintenance of the batteries, while most appliances have safety features to protect the battery, the frequent power cuts, voltage drops and surges make safety a real concern.

Lights and cooling devices such as fans and air coolers can be purchased as rechargeable items, with built in batteries. They have become hugely popular in 2023 compared to previous years. Cooling devices are used to reduce heat, especially for those who cannot move such as elderly people and to improve the sleeping environment at night. Rechargeable lights are used across households and small businesses, especially for dwellings that are, by design, dark inside during the day and at night. There are two types of rechargeable lights; portable light bulbs that must be charged via a plug and emergency lights that are fixed in a lighting socket and automatically charge an internal battery when being used with grid electricity. Both forms of rechargeable lights have become incredibly popular and can be found sold in every community, through shops and mobile vendors. Power banks and portable power stations are considered cheap and easy to install and use and therefore are popular for low electricity demand household amenities such as Wi-Fi and charging personal electronic devices. Portable power stations are less commonly used but can accommodate electric items via plug sockets. While power banks are often used for Wi-Fi, UPS systems, that are also cheap and easy to install, are preferred as the routers can operate through the UPS on and off grid power allowing for no breaks in connectivity when power is cut.

A common solution used by households is the adaptation of installing an inverter and battery in the home. Inverters are electronic devices that act as an intermediary between batteries that store and supply direct current (DC) power, and the alternating current (AC) power supplied by the grid and required by electrical appliances. Businesses that rely on high voltage electricity, such as restaurants due to refrigerators and freezers are less able to use this adaptation due to a mismatch between their capacity needs and what the battery can provide, though some small businesses such as those that rely on computers, or retail could utilize this solution effectively. Inverters and batteries are used

mostly for lighting and essential items such as Wi-Fi, television, ceiling fans, desktop computers etc. The number of items that can be used and length of time power can be supplied depends on the inverter and battery capacity with most households and small businesses having to prioritize the use of essential electrical devices. Purchasing and setting up an inverter and battery can be cheaper compared to alternative power sources however rewiring needs to be completed at installation to direct power from the battery and grid to the desired built in electrical items such as ceiling fans and lights, though this is not required for all uses. It was widely acknowledged that inverter models that allow the power source to switch automatically between grid and battery power are easier to use, though more expensive to install, and therefore preferred over other models that need to be manually changed over when the power is cut.

**FIGURE 12 : Mobile rechargeable light sellers**



Source: digital ethnography

**BOX 5 : A note on batteries**

Batteries are an essential part of adaptations and are also used in solar alternative power sources (discussed later). Batteries are the most challenging part of power shortage solutions according to suppliers in the sector. Most often batteries are what consumers come back to sellers regarding, as they need maintenance and repair regularly.

Most common type of batteries for inverters and solar systems:

- **Lead-Acid Batteries:** Lead-acid batteries, specifically deep-cycle batteries, are a popular choice for household solar systems and inverters. They are relatively inexpensive, readily available, and well-suited for storing energy generated by solar panels. Within the lead-acid battery category, there are two main types used: flooded lead-acid batteries, which require periodic maintenance (acid level checking and battery water additions), and sealed lead-acid batteries (VRLA), which are maintenance-free.
- **Lithium Iron Phosphate (LiFePO<sub>4</sub>) Batteries:** LiFePO<sub>4</sub> batteries are a specific type of lithium-ion battery chemistry that is gaining traction in household solar systems and inverters. They are known for their exceptional safety features, long cycle life, and thermal stability. LiFePO<sub>4</sub> batteries are generally more expensive upfront but offer excellent performance and reliability over the long term and require little to no maintenance.

## Alternative Power Sources

Alternative power sources include systems that generate power through non-grid and non-battery energy sources. This includes solar systems, and diesel and gasoline engine generators. Diesel and gasoline generators have long been used and continue to serve as a crucial backup power solution in Yangon, especially for businesses. In December 2022, 91% of firms nationally who had implemented a power shortage solution decided to invest in diesel generators.<sup>23</sup> Generators have the ability to deliver sizable power output for business and household needs. For small businesses and households that rent their premises, the portable nature of small generators (between 1kw and 10kw) offer a distinct advantage as the investment is not tied to the specific location of their operations. These generators can typically power lights, some fans and fridges. Small portable generators can also be a shared resource among community members either between friends or via businesses that rent generators to people. For increased output to service air conditioning units and larger or more electrical equipment businesses look at generators up to 50kw. Consumers generally prefer the convenience of an on/off switch over the recoil starter string commonly found in smaller, older portable generators, which requires physical strength to pull and start. Large generators (over 50kw) are often used in large condominiums and mixed-use developments for communal amenities, water pumps and elevators, and/or shared among the individual building units.

“Most of my clients are businesspeople, and for business purposes such as restaurants and bars and drinking water production. Household customers are very few.”

- Generator store owner

### BOX 6 : calculating the cost of communal generators

Buildings that have generators for communal use tend to be higher in price to rent and buy and have monthly management fees to cover this communal amenity (use and maintenance). In buildings where a communal generator can be used by individual units, use is monitored by meters and costs are calculated in one of two ways. For the first way, an average per unit price is fixed based on the average difference between the cost of the generator per unit and YESC tariff. For the second way, households are charged according to their generator use at one fixed rate on top of their YESC bills.

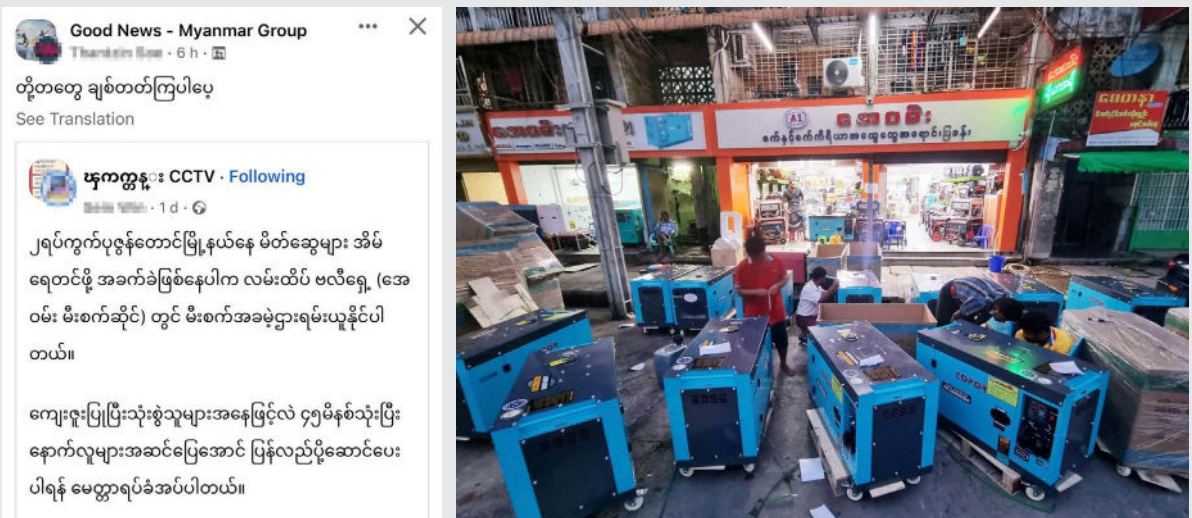
While generators have traditionally been a common solution to power shortages, they do present challenges for users. Foremost is the noise that is created by generators, which can be disruptive to neighbors, especially at nighttime. Fear of noise complaints are mostly cited by households and small businesses that operate in residential areas. Second is overheating, reducing the capacity of the generator to be able to run over long periods of time. Older generators are especially susceptible to this problem, breaking down and stopping if overheated. Cardboard is used over smaller generators to act as a sunshade and larger ones have the protective boxes opened occasionally to enable air to flow around the engine. However, when the generator protective boxes are open more noise is produced so it is hard for users to completely stop generators from overheating while also balancing challenges of noise. Generators are operated on fuels - diesel and gasoline, which is susceptible to price fluctuations and can be costly for users. Though managing how long a generator is run and in what instances it is turned on can help to control daily use costs.

FIGURE 13: Generator alternative power source (Yangon)



Source: transect walks

**FIGURE 14: Generator alternative power source solution (Yangon)**



Source: digital ethnography

Renewable solar power is gaining traction and interest among individuals as an alternative energy source in Yangon. This technology is utilised in smaller devices such as solar power stations and lights, which operate similarly to the previously mentioned adaptations but are charged using sunlight instead of grid electricity. Solar power can also meet the electrical needs of households and small businesses through the use of photovoltaic (PV or solar) panels, batteries, and inverters. Hybrid inverter and battery systems allow for both grid electricity and solar power usage. Typically, solar is utilised by households living in houses with land, however, in Yangon, apartments have also been able to use solar for lighting and small appliances by using balcony space, walls, and roofs to host the PV panels. PV panels can be purchased at varying sizes for different generation capacities

**FIGURE 15: Solar alternative power source solution (Yangon)**



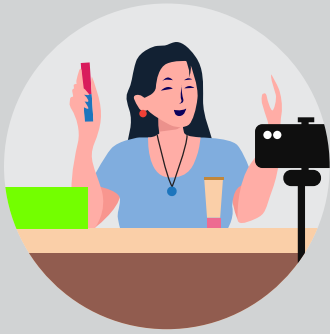
Source: transect walks and digital ethnography

and can be added in stages to increase capacity over time. Solar power adoption by businesses is limited due to higher capacity requirements. Solar technology offers significant advantages; while it requires a relatively high upfront investment, solar power eliminates daily fuel costs and offers low maintenance and battery replacement expenses. Moreover, solar power is eco-friendly, noise-free, and can seamlessly integrate with grid electricity using a hybrid inverter in larger solar systems. Limited technical knowledge, particularly perceptions that solar requires land and/or a house, and cost, discourage some from implementing solar power systems at home. Exposure to sunlight is needed also and can discourage apartment dwellers. However, creative solutions and frames have been implemented by those living in Yangon's dense urban center.



## 2. FURTHER CASE STUDIES

Hi, I am Thu Thu Aung!



Thu Thu Aung<sup>24</sup> owns an online business selling imported cosmetics which she runs from her household. After the breakdown of her generator, Thu Thu Aung choose a mix of adaptations and new alternative power solutions. She has been able to mitigate some of the negative impacts of the electricity shortages through this combination, addressing the needs of her business and household. She is now able to have constant contact with customers and support her nephew's online education, but feels more solutions are needed for long term security.

Thu Thu Aung is a 37-year-old female entrepreneur from Myanmar Who lives in a household of eight people and has an online business selling imported cosmetics. Thu Thu Aung encountered health issues, security concerns, and disruptions to her daily life because of power cuts.

Thu Thu Aung resides in a 10-year-old house and experiences both scheduled and unscheduled power cuts, adversely affecting her well-being and overall productivity. The security of her property was compromised due to a recent incident involving the theft of car batteries, as the power outage rendered the CCTV system inoperable.

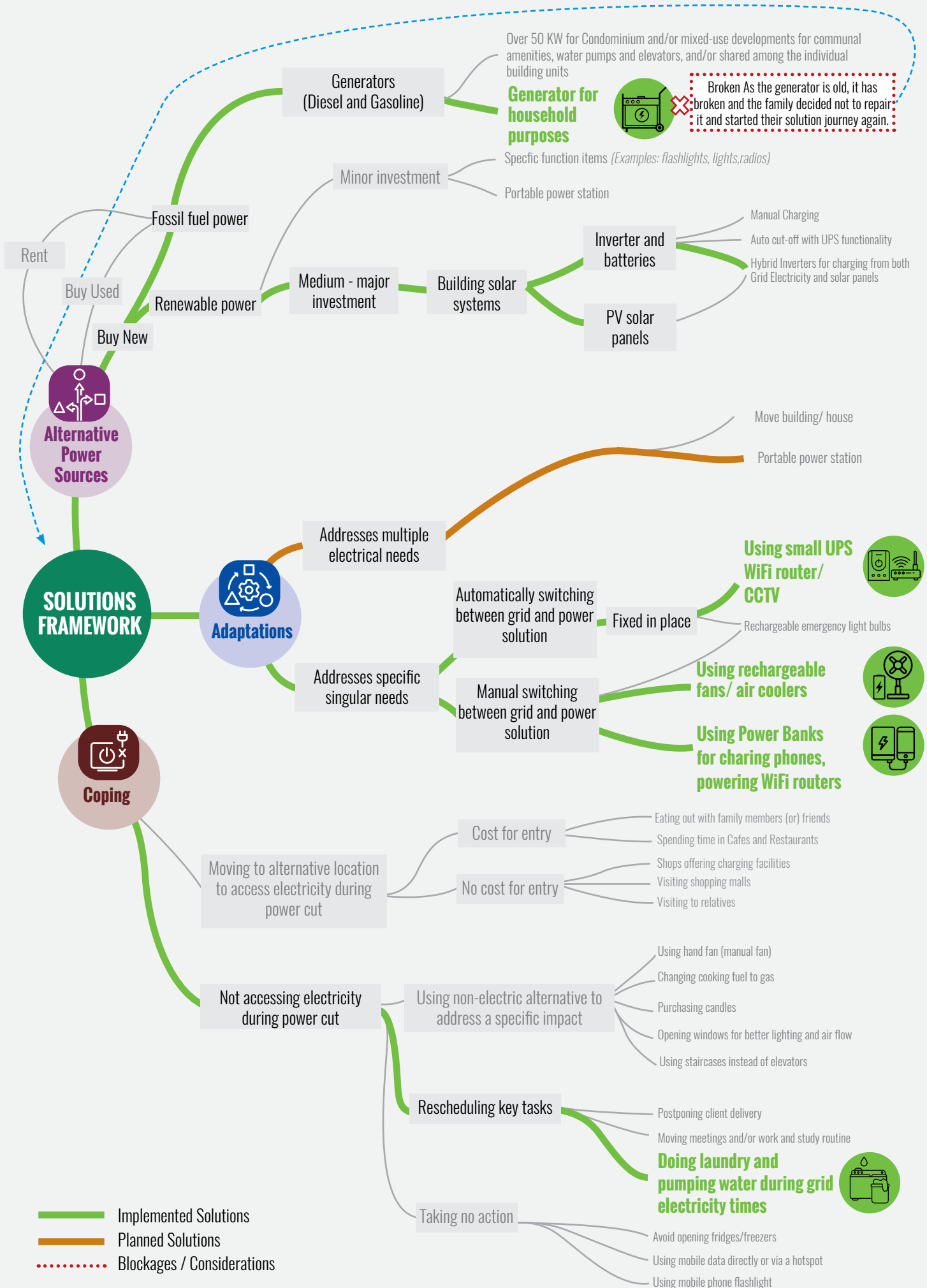
### **Coping, Adaptations and Alternative Power Sources:**

Thu Thu Aung Initially relied on a generator, which broke down and was not repaired. She transitioned to solar power as an alternative energy. Additionally, she made adaptations to her daily routine, ensuring essential tasks such as laundry, cooking, and water pumping were carried out during periods of grid electricity availability. Pumping water every day is the family's main concern, so she wakes up early in the morning to do this. She also cooks rice with a rice cooker at this time. For Wi-Fi she has connected it to a UPS system, so it automatically stays on when power is cut. This is important so she can continue responding to her business customers even during power cuts and avoid additional phone data charges. To help her sleep at night she has also bought a rechargeable air-cooler that she can use in her bedroom.

By installing solar panels, Thu Thu Aung's family uses solar energy to power lighting throughout her house. This solution provided flexibility in using lights without concern for power cuts. Furthermore, the solar power system supported the educational needs of her two nephews, facilitating uninterrupted online classes in 2022, by powering two computers for them.



**FIGURE 16: Thu Thu Aung's journey to mitigate the impacts of power cuts**



- Implemented Solutions
- Planned Solutions
- ..... Blockages / Considerations

Thu Thu Aung household's decision to invest in solar power was driven by environmental considerations and anticipation of worsening power supply issues in Yangon. Seeking guidance, her family consulted an electrical engineer, a friend of her brothers, who assisted in selecting and purchasing the appropriate solar power system. The engineer also provided valuable insights into system maintenance and troubleshooting.

The initial cost of Thu Thu Aung's solar power system was 1,700,000 MMK. The solar panels come with a 20-year warranty, ensuring long-term reliability.

### **Future Considerations:**

During the solar battery replacement, and thus reduced solar capacity, Thu Thu Aung borrowed a power station from her brother. Her brother's office has supplied him with it as a backup solution for work. Considering the positive experience, she is considering purchasing a high-voltage power station with three outlets for her own work, should the power situation worsen. The estimated cost of this is 3,500,000 MMK.

### **Conclusion:**

Thu Thu Aung's case study demonstrates her household's proactive approach in addressing power shortage challenges through the implementation of combined coping behaviors, adaptations and alternative power sources. By embracing solar power and making necessary adaptations, she effectively overcame the immediate adverse effects of power cuts on her health, security, and business operations.

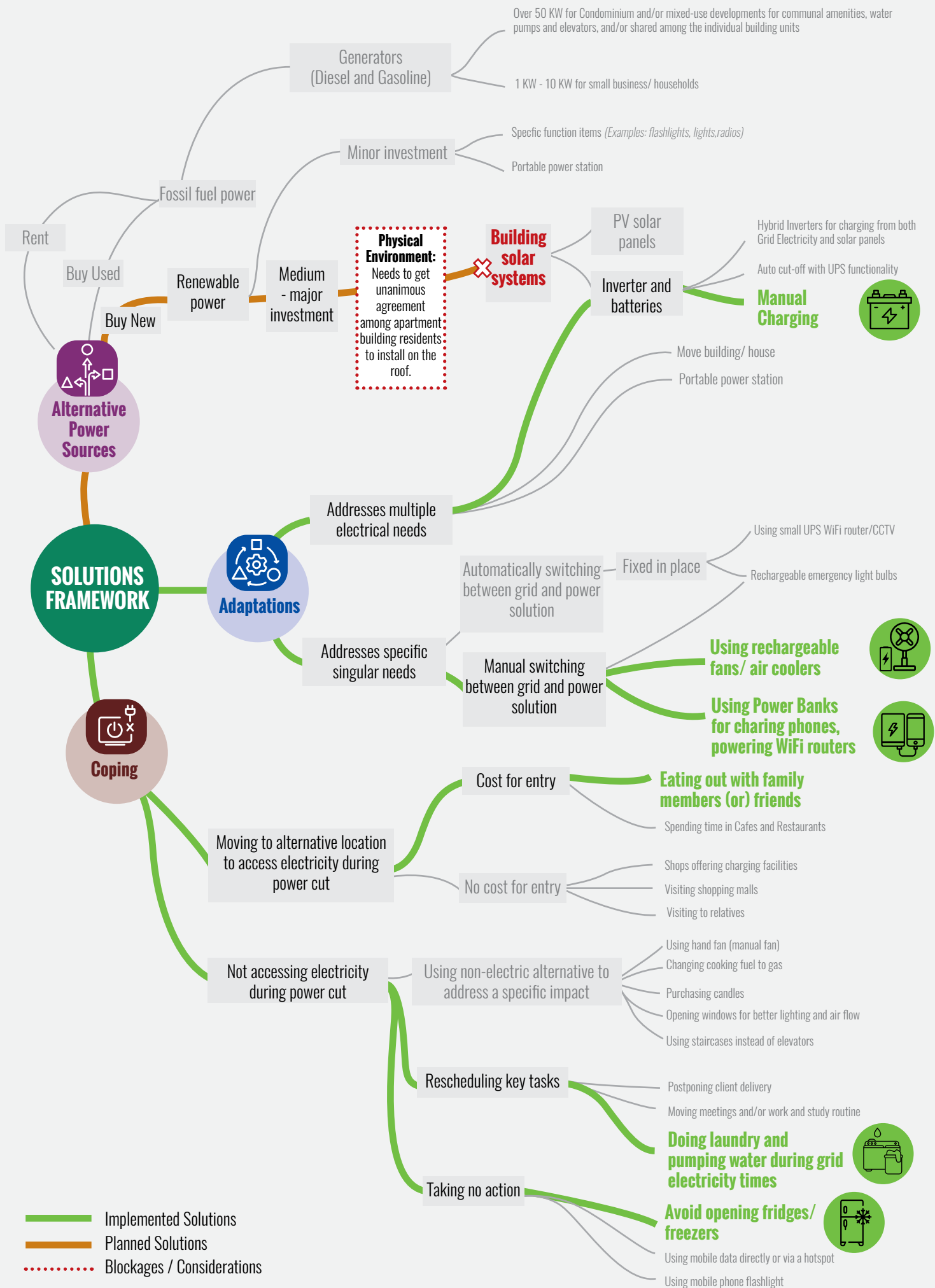


Hi, I am Aye Moe!

Aye Moe<sup>25</sup> lives in an apartment in Yangon. The lack of electricity causes her discomfort and mental stress. She and her husband use a combination of solutions to meet their needs. However even with this combination it is not sufficient. She has also considered solar as an alternative power source for lighting and air-conditioning but as she lives in an apartment she has challenges getting a unanimous agreement from her neighbors to communally install solar on the roof.

This case study explores the experiences of Aye Moe, a resident of an apartment in Yangon, and her challenges in dealing with power outages. Aye Moe's apartment often lacks electricity at night, leading to discomfort, reduced productivity, and concerns for security. Unable to use the air conditioning unit in the hot weather leads to discomfort and exhaustion, impacting her sleep quality.

**FIGURE 17: Aye Moe's journey to mitigate the impacts of power cuts**



- Implemented Solutions
- Planned Solutions
- ⋯ Blockages / Considerations

As a result, she often feels sleepy and struggles to concentrate on work, affecting her performance. While the lack of power has no direct effect on her health, it indirectly affects her overall well-being due to inadequate rest and compromised mental functioning. Moreover, the absence of street lighting poses security concerns, particularly related to theft.

**Coping behaviors and adaptations:**

Aye Moe has installed an inverter in her apartment, primarily for lighting purposes. The inverter does not support the use of air conditioning, limiting its effectiveness in addressing heat-related challenges. However, she has purchased a rechargeable fan and a power bank for charging her phone battery and the rechargeable fan. In the mornings, she performs essential tasks such as pumping water, washing, and cooking, while also charging the power bank. Aye Moe has a well-functioning refrigerator and because she does not open it often during power cuts it allows her to store food, reducing the need for frequent trips to the market.

During electricity outages, Aye Moe and her husband have decided not to cook and instead have dinner outside. This strategy helps them avoid the inconvenience of preparing meals in the absence of electricity. It also provides them with an opportunity to spend time together and relieve some of the stress caused by the power cuts.

**Future Considerations:**

Aye Moe plans to install solar panels in her apartment building if the electricity situation worsens. She has initiated discussions with other apartment owners, who are also relatives, to install solar panels for the entire eight-story building. The objective is to power the air conditioning units and lighting systems using solar energy. While the other apartment owners have agreed in principle to install solar panels, obtaining unanimous agreement remains a challenge. The limited space available for solar panel placement poses another hurdle in implementing this alternative power solution.

**Conclusion:**

Aye Moe's experience living in an apartment without nighttime electricity highlights the impact of power outages on daily life, work, and security. By utilizing adaptations like the inverter and power banks, and coping behaviors like dining out during power cuts, she has adapted to mitigate some of the challenges. Aye Moe's future plan to install solar panels will support finding a sustainable solution for the recurring electricity issues faced by her apartment building.

Hi, I am Aung Min!



Aung Min<sup>26</sup> owns a small welding business. Having chosen a mix of coping and alternative power solutions he has been able to mitigate some of the negative impacts of the electricity shortages on his business. However he is still experiencing a reduced income due to power cuts. The alternative power source he invested in does not meet his current need and he often relies on customer's understanding when delays occur. He does not have the income to purchase a larger generator a common blockage for business owners.

This case study examines the experiences of Aung Min, a welding business owner. Aung Min runs a small welding business with six employees and faces the impact of scheduled power cuts on his operations. The irregularity of scheduled power cuts often disrupts Aung Min's work schedule, causing delays of a few days. For instance, work planned for a Monday may have to be rescheduled for Wednesday due to unexpected power cuts. While some customers are understanding of the situation, others with urgent orders may not be as accommodating.

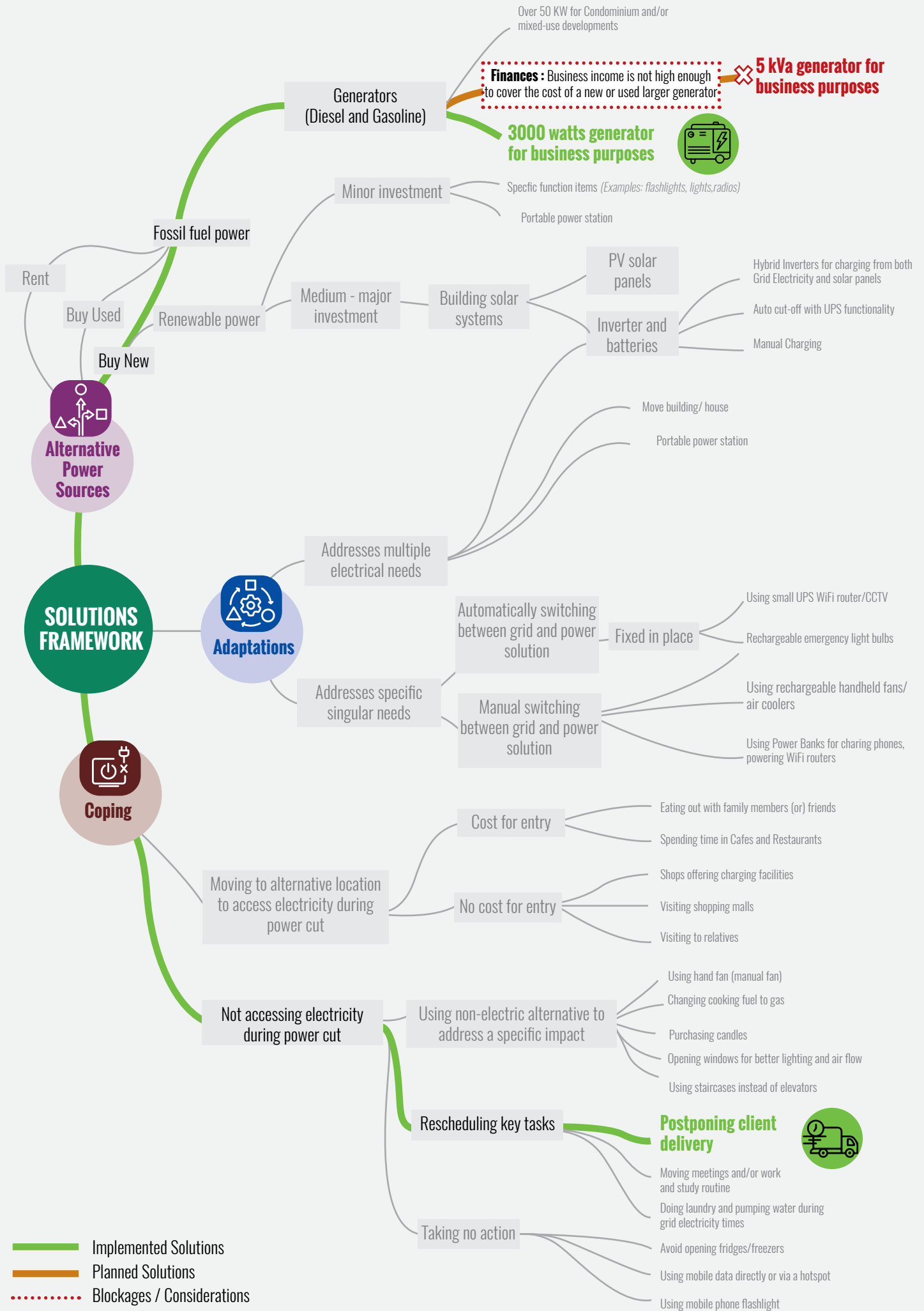
#### **Alternative power source:**

To meet urgent demands, Aung Min occasionally resorts to using the generator. Aung Min purchased a second-hand generator for over 500,000 MMK, which originated from Thailand. Recently, a maintenance issue arose when he neglected to check the engine oil, resulting in damage that cost approximately 180,000 MMK to repair. Despite this incident, the generator is generally safe, but its limited capacity of 3000 watts poses challenges in handling heavy workloads and managing employees efficiently. Meeting customers' expectations for fast service becomes difficult as the generator can only support the work of one person at a time. Some workers leave his team to work elsewhere because they are unable to get enough work with Aung Min and face financial difficulties. The limited capacity of the generator poses a significant challenge in coordinating and controlling the workers, leading to decreased productivity.

#### **Future considerations:**

Aung Min desires a larger generator that can accommodate three workers simultaneously, allowing for welding and drilling tasks. However, financial constraints prevent him from acquiring a larger generator at the moment. Despite considering the purchase of a larger generator multiple times, Aung Min has refrained from doing so due to the business's income limitations. The cost of a used generator exceeds 1,000,000 MMK, while a new generator meeting his requirements is priced around 3,000,000 MMK. Aung Min believes that regular electricity is crucial for his welding business, as alternative power sources like solar power and inverters only provide lighting and are inadequate for

**FIGURE 18: Aung Min's journey to mitigate the impacts of power cuts.**



- Implemented Solutions
- Planned Solutions
- ⋯ Blockages / Considerations

heavy duty electronic devices. In the future, he plans to buy a 5kVA generator with an easy on/off switch control, intending to place it in his backyard. He previously owned a similar wattage generator but sold it due to noise concerns and the inconvenience of a recoil starter cord.

**Conclusion:**

Aung Min's welding business faces challenges due to power cuts and the limited capacity of a small generator. While scheduled power cuts allow for better planning, managing workers and meeting customer expectations remain significant hurdles. Acquiring a larger generator that can support multiple workers simultaneously is crucial for the business's growth and productivity. However, current financial constraints prevent Aung Min from making this investment. Nonetheless, Aung Min's resourcefulness and adaptability enable his business to continue operating during power cuts, ensuring its sustainability.



# ENDNOTES

- 1 Transect walks are a method for gathering spatial data on an area by observing people, surroundings and resources while walking through a community.
- 2 World Bank (2022). "Energy Sector: Myanmar Infrastructure Monitoring." <http://hdl.handle.net/10986/37422> License: CC BY 3.0 IGO.
- 3 Myanmar Information Management Unit (2021). "Myanmar by night 28 years at a glance [Video screenshot]." <https://themimu.info/nightlights> accessed Jun 16 2023.
- 4 In 2022 the Ministry of Electricity and Energy (MoEE), was reorganized into the Ministry of Electric Power (MOEP) and Ministry of Energy (MOE). In this report the current ministry name, MOEP is used throughout.
- 5 The Irrawaddy (July 15 2021). "Myanmar's electricity sector crippled since military coup." <https://www.irrawaddy.com/news/burma/myanmars-electricity-sector-crippled-since-military-coup.html>
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The Asia Foundation is a nonprofit international development organization committed to improving lives and expanding opportunities across Asia and the Pacific. Informed by decades of experience and deep local expertise, our work across the region is focused on good governance, women's empowerment and gender equality, inclusive economic growth, environment and climate action, and regional and international relations.