Chapter 2

Energy for Peace and Sustainable Development

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Chapter 2

Energy for Peace and Sustainable Development

This chapter examines renewable-energy electrification and ethnic conflicts. Our point of departure is that distributed renewables can play a role in electrifying rural areas that had or have ongoing ethnic conflicts and help resolve them.

The energy situation has been analysed using a technical or economic approach, but a social approach is also needed to understand the local context in ethnic-minority areas. The energy justice theory is used as a lens for analysing the case at hand.

Since its independence in 1948, Myanmar has suffered ethnic conflicts, which have not yet been resolved. Myanmar has huge ethnic diversity, with the majority, the Bamar, accounting for about two-thirds of the population, whilst more than 100 ethnic-minority groups account for the rest. The causes of conflict date back to the colonial era and are complexly intertwined with not only ethnicity but also history, religion, politics, and interventions by neighbouring countries. The presence of natural resources such as hydropower in ethnic-minority areas is more a curse than a blessing as it sometimes exacerbates conflicts.

About 20 ethnic armed organisations (EAOs) are recognised as opponents of the Myanmar army (Tatmadaw), but they differ greatly in size, legitimacy, background, and relationship with the government. Thus far, 10 EAOs have signed the Nationwide Ceasefire Agreement, but the current peace process seems to be in a deadlock because of lack of trust.

The government prioritises economic development, believing that reducing poverty will result in decreasing conflict. However, the issue is not so simple and large-scale development programmes sometimes exacerbate conflicts, especially if they are not conflict-sensitive. A distinct example is a large-scale hydropower dam.

Semi-structured interviews with key stakeholders indicated that a cooperative programme between a state or region government and EAOs and/or local civil society organisations (CSOs) is more effective for building trust amongst local stakeholders than large-scale development programmes. To elicit smooth cooperation from both sides, such programmes

should be less political and more practical and agreeable. A good example is a health programme between a government ministry and health departments of EAOs.

Energy access has received relatively less attention than other sectors such as health care and education although it provides local benefits. To be conflict-sensitive means to implement a programme carefully. Large-scale construction is often met with scepticism, and the national grid extension would not be an exception. In contrast, decentralised power sources such as SHSs or mini-grids face smaller hurdles. SHSs are used primarily for lighting and mobile-phone charging but they are quick to deploy. Our key message is that decentralised renewable energy can be the subject of cooperative projects, which could encourage building trust amongst local stakeholders.

1. Electrification, Energy Access Injustice, and Conflicts

1.1. Energy Access

Overall Situation

The electrification rate has not yet surpassed 50%, which is low by global standards (Billen and Bianchi, 2019). The government has set a goal of 100% electrification by 2030 (Ministry of Electricity and Energy Electricity Supply Enterprise, The Republic of the Union of Myanmar, 2019). One challenge is to fully electrify peripheral regions that once had or continue to experience ethnic conflicts. Myanmar has ratified the Paris Agreement (The Republic of the Union of Myanmar, 2015), so electrification using renewable energy sources is preferable to using fossil fuels. We analysed the cost-competitiveness of renewable-energy mini-grids, which have gained attention as off-grid methods of electrification, and diesel generators (Numata, Sugiyama, Mogi, Wunna Swe, and Anbumozhi, 2018), as well as barriers and other factors unrelated to the economy (Numata, Sugiyama, and Mogi, 2018). However, '[a]ll too often, energy policy and technology discussions are limited to the domains of engineering and economics' (Sovacool, Heffron, McCauley, and Goldthau, 2016). The analysis of the energy sector has been focused on the technical side and on economic evaluations that are primarily concerned with cost, but 'social, political, and cultural domains' also need to be considered and understood (Sovacool, 2012).

As Myanmar makes progress on electrification, it increasingly faces the tough question of how to electrify peripheral regions that had and/or continue to have ethnic conflicts. Development projects in those regions, including some hydropower dams, suffered from 'energy injustice'. In recent years, the declining costs of distributed renewables began changing the energy landscape, allowing rural villages to take advantage of new technologies to gain access to modern electricity services.

This chapter examines electrification with renewables, especially in rural areas with ethnic conflicts. Our point of departure is that distributed renewables can play a role in electrifying rural areas that had and/or have ongoing ethnic conflicts, and that such a contribution could possibly help resolve them. This chapter (i) reviews the energy-justice theory; (ii) reviews the history of ethnic conflicts since the Second World War; (iii) critically appraises development and electrification projects in conflict areas; and (iv) presents the initial findings from semi-structured interviews with key stakeholders, focusing on high-level messages.

1.2. Energy Justice

Energy justice is a widely used framework for studying injustice in the energy sector (Jenkins, Mccauley, Heffron, Stephan, and Rehner, 2016; Sovacool and Dworkin, 2015). Its core tenets are distributional justice, justice as recognition, and procedural justice. Distributional justice focuses on whether public goods and public 'bads' are fairly distributed by, for example, considering whether resources and pollution are distributed fairly. Recognition-based justice focuses on who is being ignored within the decision-making process. Procedural justice is concerned with how decision-making occurs, who participates in it, and whether appropriate information and compensation are being offered to communities. Availability, affordability, due process, transparency and accountability, sustainability, intragenerational and intergenerational equity, responsibility, resistance, and intersectionality are the principles of the energy justice framework (Sovacool, Burke, Baker, Kotikalapudi, and Wlokas, 2017).

Energy and due process, energy poverty, energy resources, amongst others, have been cited as specific problems for the analytical applications of energy justice (Sovacool and Dworkin, 2015). Energy poverty is a distributive-justice problem (Sovacool et al., 2016). The effects of a decline in energy poverty include not only a decrease in health problems caused by direct indoor air pollution and a positive impact on education from access to electricity, but also a

decrease in absenteeism due to health problems and an impact on gender roles (as both cooking and gathering firewood are often considered women's roles) (Sovacool, 2012).

Hydropower dams are a topic suitable for an energy-justice framework. Internal displacement of people as a result of dam construction represents a violation of procedural justice (Sovacool et al., 2016). Siciliano, Urban, Tan-Mullins, and Mohan (2018) have analysed decision-making processes surrounding the construction of large-scale dams in Cambodia, Malaysia, Ghana, and Nigeria using an energy-justice framework. However, the framework has been used only in a study of coal-fired power plants in post-conflict Kosovo (Lappe-Osthege and Andreas, 2017).

Sovacool (2013) summarises the challenges of reviewing the literature on energy poverty in Myanmar: poverty and subsistence needs, conflicting priorities, lack of resources, and policy fragmentation. Few studies, however, consider the problem of minorities in analysing energy poverty in Myanmar. The majority Bamar also experience energy poverty, but as electrification proceeds from areas that the government can easily engage with, delays are, unsurprisingly, in minority areas, where substantial coordination is necessary to conduct electrification. Energy poverty and ethnicity are, therefore, not unrelated. Energy infrastructure and services should be distributed to all members of society regardless of 'income, race, etc.', and 'the divergent perspectives rooted in social, cultural, ethnic, racial and gender differences' should be recognised, whilst marginalised groups should be allowed to participate in decision-making and its attendant processes (McCauley, Heffron, Stephan, and Jenkins, 2013; Jenkins, Sovacool, and Mccauley, 2018). These recommendations apply to minorities, and energy injustice should be promptly corrected.

Although this chapter does not attempt to contribute to the energy-justice theory, it uses energy justice as a lens for analysing the case at hand.

2. Brief Overview of Conflicts

2.1. Ethnic Groups

Since gaining independence in 1948, Myanmar has witnessed a series of primarily ethnic conflicts in what may be described as one of the world's longest-running civil wars. The population is approximately two-thirds Bamar, with the remainder made up of various ethnic

minorities; 135 ethnic groups are recognised by the government (Central Intelligence Agency, 2019; Lall and South, 2018). Table 2.1 the major national ethnic races and their constituent subgroups.

Table2.1: Ethnic Groups[1]

Major National Ethnic Races	Number of Subgroups	Subgroups
Kachin	12	Kachin, Trone, Dalaung, Jinghpaw, Guari, Hkahku, Duleng, Maru (Lawgore), Rawang, Lashi (La Chit), Atsi, Lisu
Kayah (Karenni)	9	Kayah, Zayein, Ka-Yun (Padaung), Gheko, Kebar, Bre (Ka-Yaw), Manu Manaw, Yin Talai, Yin Baw
Kayin (Karen)	11	Kayin, Kayinpyu, Pa-Le-Chi, Mon Kayin (Sarpyu), Sgaw, Ta-Lay-Pwa, Paku, Bwe, Monnepwa, Monpwa, Shu (Pwo)
Chin	53	Chin, Meithei (Kathe), Saline, Ka-Lin -Kaw (Lushay), Khami, Awa Khami, Khawno, Kaungso, Kaung Saing Chin, Kwelshin, Kwangli (Sim), Gunte(Lyente), Gwete, Ngorn, Zizan, Sentang, Saing Zan, Za-How, Zotung, Zo-Pe, Zo, Zah nyet (Zanniet), Tapong, Tiddim (Hai-Dim), Tay-Zan, Taishon, Thado, Torr, Dim, Dai (Yindu), Naga, Tangh kul, Malin, Panun, Magun, Matu, Miram (Mara), Mi-er, Mgan, Lushei (Lushay), Laymyo, Lyente, Lawhtu, Lai, Lai zao, Wakim (Mro), Haulngo, Anu, Anu n, Oo-Pu, Lhinbu, Asho (Plain), Rongtu
Bamar	9	Bamar, Dawei, Beik, Yaw, Yabein, Kadu, Ganan, Salon, Hpon
Mon	1	Mon
Rakhine	7	Rakhine, Kamein, Kwe Myi, Daingnet, Marama gyi, Mro, Thet
Shan	33	Shan, Yun (Lao), Kwi, Pyin, Yao, Danaw, Pale, En, Son, Khamu, Kaw (Akha-E-Kaw), Kokang, Khamti Shan, Hkun, Taung yo, Danu, Palaung, Man Zi, Yin Kya, Yin Net, Shan Gale, Shan Gyi, Lahu, Intha, Eik-swair, Pa-O, Tai-Loi, Tai-Lem, Tai-Lon, Tai-Lay, Maingtha, Maw Shan, Wa

Source: Smith (1994), Embassy of the Union of Myanmar Brussels (n.d.).

Although data related to religion and ethnicity was not collected in the 2014 census, religious data was published in 2016 (Department of Population Ministry of Immigration and Population, 2015). Data on ethnicity, however, has not been published (Tun, 2017; S. Y. Aung, 2018). Roughly 100 languages are spoken within Myanmar, sometimes synonymous with ethnicity and sometimes not (Ethnologue, n.d.). Some languages have their own alphabets and some do not (Everson and Hosken, 2006). Chin state has so many languages that the

[1] The Rohingya are not included in the list of 135 ethnicities recognized by the government. As a discussion of the Rohingya would be extensive and complex, it has been excluded from this chapter.

villages on the other side of the valley may speak a different dialect (Takahashi, 2018). The official language is Burmese, the language of the Bamar (Smith, 1994).

The administrative districts are made up of seven states and seven regions, as well as self-administered zones and divisions. Most of the population in the seven regions is Bamar. The seven states are Chin, Kachin, Kayin, Kayah, Mon, Rakhine, and Shan – named for the ethnic group that makes up most of each state's population. However, the distribution of ethnicities within each state is diverse and does not necessarily coincide with the ethnolinguistic boundaries of states and regions or townships. For example, a number of Kayin (Karen) and Rakhine people reside in the Ayeyarwady region, and the ministers of Kayin ethnic affairs and Rakhine ethnic affairs both belong to the Ayeyarwady region government.

The 2008 Constitution provides for six self-administered zones (Danu, Kokang, Pa'O, and Pa Laung) and divisions (Wa in Shan state, and Naga in Sagaing region) (Office of the Civil Service Commission, n.d.).

2.2. Ethnic Armed Organisations

Myanmar has one of the longest-running conflicts in the world. The war has become entangled with the history of neighbouring countries, greatly complicating it. About 20 ethnic armed organisations (EAOs) of various sizes, degrees of sophistication, and origin operate in the country. The more influential ones have organised initiatives for education, health, and so on, and directly provide social services to the areas they control independently or through coordination with CSOs (Christophersen and Stave, 2018). For example, the leadership of an influential EAO, the Karen National Union (KNU), is determined by formal election (S. Y. Naing, 2017). Table 2.2 lists the names and acronyms of the major EAOs alphabetically.

Table 2.2: Names and Abbreviations of Active Ethnic Armed Organisations

Political Organisation	Armed Wing
ULA/**AA**	United League of Arakan/Arakan Army
ABSDF	All Burma Students' Democratic Front
ALP/ALA	Arakan Liberation Party/Arakan Liberation Army
CNF/CNA	Chin National Front/Chin National Army
DKBA (formerly DKBA-5)	Democratic Karen Benevolent (Buddhist) Army
KIO/KIA	Kachin Independence Organization/Army
KNPP/KA	Karenni National Progressive Party/Karenni Army
KNU/KNLA	Karen National Union/Karen National Liberation Army
KNU/KNLA-PC (not related to KNU or KNLA)	Karen Nation Union/Karen National Liberation Army Peace Council
KUKI	Kuki National Organisation/Kuki National Army
LDU	Lahu Democratic Union
MNDAA	Myanmar National Democratic Alliance Army
PSC/**NDAA**(-ESS)	Peace and Solidarity Committee (Mongla)/National Democratic Alliance Association–East Shan State
NMSP/NMLA	New Mon State Party/Mon National Liberation Army
NSCN-K	National Socialist Council of Nagaland–Khaplang
PNLO/PNLA	Pa-O National Liberation Organization/Army
RCSS/SSA(-S)	Restoration Council of Shan State/Shan State Army(–South)
SSPP/SSA(-N)	Shan State Progress Party/Shan State Army(–North)
PSLF/**TNLA**	Palaung State Liberation Front/Ta'ang National Liberation Army
UWSP/**UWSA**	United Wa State Party/Army

Note: Many organisations have a political wing and an armed wing but, for ease of comprehension, this chapter makes no distinction between them and uses the boldface acronym.
Sources: Tønnesson, Aung, and Nilsen (2019); Myanmar Peace Monitor (2016).

Table 2.3 summarises the modern history of Myanmar.

Table 2.3: Brief History of Myanmar

1886–1947	Britain uses two methods for colonial administration. Direct governance for Burma proper area – what is now Tanintharyi region, Rakhine state, Bago region, and Ayeyarwady region. Indirect governance in autonomous in peripheral areas. Appointment of more ethnic minorities than Bamar to the military and police, leading to ethnic divisiveness.
1943	Myanmar becomes independent with Japanese military support.
1945	Coup d'état led by Aung San overthrows the Japanese puppet state. British colonial rule is restored.
1947	First Panglong Agreement is concluded. Signatory General Aung San is assassinated.
	KNU is formed in Kayin state, southeast Myanmar.
1948	Myanmar becomes independent under its first prime minister, U Nu. Uprisings by minority peoples and the Communist Party of Burma (CPB) cause instability.
	Kachin Independence Organization (KIO) is formed in Kachin state. Shan State Army[2] is formed in Shan state, north Myanmar.
1962	Coup d'état by General Ne Win establishes a military regime, which continues until 1988 even after Ne Win retires as president in 1981. 'Burmese Socialism' is promoted.
	Tatmadaw (the military) adopts the infamous 'four cuts' strategy to deprive ethnic armed organisations (EAOs) of food, funds, intelligence, and recruits from villages. Villagers are unable to farm, are forcibly relocated and internally displaced.
1988	'8888 uprising' takes place. Demonstrations demanding democracy bring down the socialist administration after 26 years. The military seizes power under General Saw Maung.
	CPB collapses and each ethnic group forms its own EAO. In north-east Shan state: Myanmar National Democratic Alliance Army (MNDAA) of the Kokang, United Wa State Army (UWSA) of the Wa, and National Democratic Alliance Association (NDAA)

[2] This became the base of the armed wings of the SSPP and RCSS, the Shan State Army–North and Shan State Army–South.

	of the Mong La Shan and the Aka. In north-east Kachin state: New Democratic Army–Kachin (NDA-K) of the Kachin. Future prime minister Khin Nyunt concludes a ceasefire agreement allowing these four EAOs to turn their areas of control into special administrative districts.
1990	National League for Democracy (NLD) wins general elections by a landslide, but the military ignores the results and suppresses dissent. Aung San Suu Kyi is put under house arrest (three times until 2010 for a total of 15 years).
1992	Than Shwe becomes head of state and is commander-in-chief until 2011, ranking fourth on the 'World's Worst Dictators' list in 2009.
	Under pressure from the Thailand government to send back 10,000 internally displaced Mon, the New Mon State Party (NMSP) and the government of Prime Minister Khin Nyunt conclude a bilateral ceasefire. The movement for peace wanes with his overthrow in 2004.
2006	The capital is moved to Nay Pyi Taw.
2007/9	The Saffron Revolution – demonstrations by monks – sweeps the nation.
2007/10	Thein Sein becomes Prime Minister.
2008	Cyclone Nargis kills 85,000 people.
2010	NLD boycotts general elections. Union Solidarity and Development Party wins.
2011	Thein Sein administration begins.
2011	Conflicts restart between the national military and KIO. Armed organisations continue to clash in north-east Myanmar.
2012	Conflicts occur between Buddhists and Muslims in Rakhine.
2015/10	The government and eight EAOs agree to a nationwide ceasefire.
2015/11	NLD wins general elections by a landslide.
2016	NLD administration begins.
	Northern Alliance is established by four EAOs that did not agree to the ceasefire: KIO, Arakan Army (AA), Ta'ang National Liberation Army (TNLA), and MNDAA.
	UWSA (which is the largest non-state army in the world and has close relations with China), Shan State Progress Party (SSPP), NDAA, and Northern Alliance form the

	Federal Political Negotiation and Consultative Committee. UWSA takes the initiative and influences non-signatory EAOs.
	AA moves its activities from Kachin state to Rakhine state, and the southern part of Chin state then becomes very active.
2018/2	NMSP and Lahu Democratic Union sign the Nationwide Ceasefire Agreement.
2018/12	Tatmadaw announces a 4-month unilateral ceasefire covering Shan and Kachin in the north-east, where Northern Alliance is active. The ceasefire does not cover AA in Rakhine state.

Sources: Myint-U (2011); Kramer (2012); Bi (2012); Ministry of Foreign Affairs of Japan (2017); Burke, Williams, Barron, Jolliffe, and Carr (2017); Tønnesson et al. (2019); Nyein (2018b); Wallechinsky (2009); Nemoto (2014); and Kubo (2014).

Areas where minorities live are often designated as black, brown (or grey), and white. Areas controlled by the state or region government or by the Tatmadaw are white, those controlled by EAOs black, and mixed-control areas brown or grey. Access to black areas is restricted for foreigners, and no maps show detailed locations of villages. Access to brown or grey areas must also be arranged in advance by foreign visitors. As they are controlled by two forces, these areas are said to be the hardest to live in even for the villagers, as taxes are collected by both the government and the EAOs, forcing residents to work for one side or the other (Jolliffe, 2014).

Nationwide Ceasefire Agreement

The central framework for the current Myanmar peace process is the Nationwide Ceasefire Agreement (NCA). In October 2015, it was signed by the Thein Sein administration and with the agreement of eight EAOs. Since 2016, when the National League for Democracy (NLD) won the November 2015 election in a landslide, the NCA has remained in place and even gained two more EAO signatories in February 2018. EAOs differ considerably in size and legitimacy, and in whether they signed the NCA or not. Amongst non-signatory EAOs, some have agreed to bilateral ceasefires with the government and some have not. Table 2.4 shows the participation status of EAOs in the NCA. Of the approximately 20 major EAOs, roughly half are signatories. However, a total of 66,000 soldiers serve in non-signatory EAOs, including the United Wa State Army (UWSA), which is thought to have a force upwards of

30,000, whilst only 17,000, or one fourth of total EAO forces, serve in signatory EAOs (Myanmar Peace Monitor, 2016). Generally, EAOs from south-east Myanmar on the border with Thailand are signatories, whilst those in the north-east along the border with China are not (Burma News International, 2017; United States Institute of Peace, 2018). Prior to and following the enactment of the NCA, internally displaced people shifted from the southern states of Shan, Kayah, and Kayin, and the south-east region of Tanintharyi in 2006, and regrouped in the states of Kachin, Shan, Rakhine, and a portion of Mon in 2016 (Burke et al., 2017). Unfortunately, the number of battles fought within EAO states has not decreased since the signing of the NCA (Bynum, 2018).

Table 2.4: Nationwide Ceasefire Agreement and Ethnic Armed Organisations: Participation Status

NCA Signatories	**NCA Non-signatories**	
	Bilateral Ceasefire	**No Ceasefire**
RCSS	UWSA	KIO
KNU	SSPP	TNLA
DKBA	NDAA	AA
ABSDF	KNPP	MNDAA
PNLO	NSCN-K	KUKI
CNF		
KNU/KNLA-PC		
ALP		
NMSP (signed in 2018 Feb.)		
LDU (signed in 2018 Feb.)		

NCA = National Ceasefire Agreement, RCSS = Restoration Council of Shan State, UWSA = United Wa State Army, KIO = Kachin Independence Organization, KNU = Karen National Union, SSPP = Shan State Progress Party, TNLA = Ta'ang National Liberation Army, DKBA = Democratic Karen Benevolent (Buddhist) Army, NDAA = National Democratic Alliance Association-East Shan State, AA = Arakan Army, ABSDF = All Burma Students' Democratic Front, KNPP = Karenni National Progressive Party, MNDAA = Myanmar National Democratic Alliance Army, PNLO = Pa-O National Liberation Organization, NSCN-K = NSCN-K: National Socialist Council of Nagaland-Khaplang, KUKI = Kuki National Organisation/Kuki National Army, CNF = Chin National Front, KNU/KNLA-PC = Karen National Union/Karen National Liberation Army Peace Council, ALP = Arakan Liberation Party,
NMSP = New Mon State Party, LDU = Lahu Democratic Union.
Source: Myanmar Peace Monitor (n.d.-b).

NCA Signatories

The main NCA signatories are the KNU, the Restoration Council of Shan State (RCSS) , and the New Mon State Party (NMSP), which became a signatory EAO in 2018 (Tønnesson et al., 2019). The origins of the All Burma Students' Democratic Front, which began as a student movement, have indirectly had an impact on higher education in Myanmar.

The origins of the main EAOs, divided into NCA signatories and non-signatories, are described in Appendix 1.

Conflicts Between EAOs

Each EAO's relationship with the government or Tatmadaw has been different, and relations between EAOs are certainly not limited to their alliances. EAOs are often one another's enemies. The RCSS, an NCA signatory, and the Shan State Progress Party (SSPP), an NCA non-signatory, are both active in Shan. Although the RCSS is active in southern Shan, whilst the SSPP is active in northern Shan, they do not keep entirely to themselves. Since the end of 2018, combat has frequently broken out in northern Shan, displacing more than 2,000 people (Weng, 2018; Weng, 2019b). As the Shan did not welcome this conflict (Tønnesson et al., 2019), peace talks finally began between the two rival EAOs in 2019 (Asianews.it, 2019). However, the Ta'ang National Liberation Army (TNLA), which allied with the SSPP against the RCSS, has not been included in the peace talks (Weng, 2019b). Conflicts between other groups have occurred, such as between the RCSS and Pa-O National Liberation Organization and between the KNU and NMSP from 2018 to April 2019 (Bynum, 2019), and between the TNLA and the RCSS, between the UWSA and National Democratic Alliance Association (NDAA), between the Arakan Army (AA) and Arakan Liberation Party in 2015–2016 (Burma News International, 2017).

2.3. Issues with the Current Peace Process

When the NLD took power, led by current State Counsellor Daw Aung San Suu Kyi, the de facto leader of the government, people hoped that the peace process would make further progress. However, it has stalled, as evidenced by the agreement of only two EAO signatories since the NLD took over.

The NCA is not a merely an agreement to cease armed conflict but is also 'a curiously half-baked seven-chapter draft road map for arriving at a comprehensive political agreement' (Tønnesson and Nilsen, 2018). It is a road map towards national reconciliation and provides for the following:

(a) signing the NCA,

(b) drafting and adopting political dialogue,

(c) holding political dialogue and negotiating security reintegration,

(d) holding a Union peace conference,

(e) signing a Union accord,

(f) ratifying the accord by the Union parliament, and

(g) implementing provisions in the accord (The Nationwide Ceasefire Agreement Between the Government of the Republic of the Union of Myanmar and the Ethnic Armed Organisations, 2015; Institute for Security & Development Policy, 2015).

Therefore, signing the NCA also means agreeing to the road map — which provides for negotiations for security reintegration — making signing even more difficult for EAOs (Jolliffe, Bainbridge, and Campbell, 2017). There is no other official way to participate in the peace process outside of signing the NCA (Tønnesson and Nilsen, 2018). The exclusion of non-signatories has allowed the Northern Alliance to emerge and the Arakan Army, a Rakhine insurgent group, to expand (Johnson [anonym], personal communication, 12 February 2019).

Distrust between EAOs and the central government runs deep. EAOs are concerned that the Tatmadaw may use the ceasefire to prepare for action (Davis [anonym], member of an international CSO, personal communication, 5 December 2018). Regions that have signed the NCA cannot be considered to be in a 'post-conflict' state and are instead considered 'fragile' (Saferworld and Karen Peace Support Network, 2019; South et al., 2018).

Myanmar has become democratic under the NLD but the Tatmadaw continues to hold significant power. It appoints the ministers of defense, home affairs, and border affairs (Republic of the Union of Myanmar, 2008) and reserves for itself 25% of seats in parliament (Republic of the Union of Myanmar, 2008; Batcheler, 2018). The Thein Sein regime was

dominated by a large pro-military party established under the previous military administration (Kudo, 2010), and the government and the military coordinated well. However, coordination between the NLD administration and the Tatmadaw is poor, and the government is 'two-headed' (Tønnesson and Nilsen, 2018) – led by de facto political leader Aung Sun Suu Kyi and the Myanmar army commander. Before it became the ruling party, the NLD had confronted the military to demand democratisation, so it is not hard to imagine that close coordination between the formerly warring factions would be difficult. As a result, ethnic minorities are forced to negotiate with both the military and the NLD administration, which increases the difficulty of negotiations (Tønnesson and Nilsen, 2018). Compared with the previous regime, which tried to gain the trust of the EAOs, including by investing in human resources, the NLD administration, some believe, is not doing enough to foster a trusting relationship with them (South et al., 2018).

Others observe that the NLD administration is more focused than previous administrations on placing CSOs under government control (Lall and South, 2018). Environmental non-governmental organisations (NGOs) generally had 'good' access under the Thein Sein administration but only 'moderate' access under the NLD administration (Simpson and Smits, 2018).

The NLD administration replaced the Myanmar Peace Center (MPC), established under the Thein Sein administration, with the National Reconciliation and Peace Center (NRPC). The MPC had sufficient human resources, received financial aid from foreign donors, and functioned well as a platform for the peace process. EAOs and military personnel were able to converse directly in the MPC. State Counsellor Daw Aung San Suu Kyi chaired the NRPC, which has been accused of failing to serve as coordinator, a role the MPC was able to fulfil (Smith [anonym], personal communication, 12 February 2019).

The NLD government is sometimes accused of being 'Burmese-centred' (Shida, 2017). Under the constitution, the chief minister of a state can be appointed by the central government from members of the state parliament and need not be a member of the majority party (Batcheler, 2018). In Rakhine, the parliament majority is held by the Arakan National Party, but the chief minister is appointed from the NLD. Such actions are seen as marginalising ethnic minorities and encourage support for the AA in Rakhine state (Weng, 2019a). Whilst General Aung San is widely respected as the hero of independence, the government is

erecting statues of him and naming bridges after him where ethnic minorities do not have any particular connection to him, causing a backlash from these communities (Lynn, 2019; K. H. Aung, 2019).

Trust has not been fostered between the military and EAOs or between the civilian government and EAOs. The government claims that poverty reduction through economic development leads to peace but some doubt that it is that simple.

3. Development and Electrification Programmes in Conflict Areas

3.1. Sensitivity to Development Programmes in Ethnic-minority Areas, Due to Past Conflict

The narrative that raising the standard of living through economic development and prosperity discourages young people from becoming radicalised and leads to regional stability and large-scale development projects is widely celebrated. However, no clear correlation has been observed between development and subnational conflicts, even in countries that have developed rapidly, such as Indonesia, the Philippines, and Thailand (Parks, Colletta, and Oppenheim, 2013). The government touts economic development as leading to peace, but its relationship to peace building is complex and has not necessarily led to its intended results (Christophersen and Stave, 2018). Economic development can even encourage conflict in some cases (Burke et al., 2017), and implementing development programmes that ignore social and political contexts can trigger adverse impacts (South et al., 2018). For ethnic minorities, 'development' often has a negative connotation or association with the government, the military, corruption amongst EAO leaders, collusion between the government and businesses, corrupt politics, and bribery (Burke et al., 2017). Therefore, development programmes led by the government are often viewed with distrust (Christophersen and Stave, 2018; South et al., 2018).

<u>Large-scale Hydropower</u>

Large-scale hydropower generation is often the first image evoked by the words 'development' and 'energy'. Myanmar has rich hydropower resources (ADB, 2016) and the country depends on them for 56% of its generated electricity (Du Pont, 2019). Since the United Nations announced the SDGs, sustainability has been emphasised in development

projects, and hydropower generation projects often require an assessment of environmental and social impacts on the river basin, along with a conventional assessment of individual projects, to ensure that hydropower development is sustainable. The International Finance Corporation (2018) released a strategic environmental assessment of the Myanmar hydropower sector , but the MOEE logo that was in the draft was deleted in the final report. The MONREC is the only Burmese ministry listed in the report, whilst the MOEE is reported to be working on a white paper on hydroelectric policy with the Government of China (Kean, 2019). It cannot be said that the idea of sustainable development of hydropower generation is widely accepted in Myanmar. Kittner and Yamaguchi (2017) note the need for greater transparency and local engagement in large-scale dam development in Myanmar, as well as for international technical assistance.

Hydropower resources are unevenly distributed in ethnic-minority areas. Amongst the 104 dams (including those suspended and identified) listed in the hydropower database (IFC, 2017), 28 are in seven regions where the Bamar ethnic group is the majority, whilst the other 76 are in seven states. For this reason, large-scale dam development has come to symbolise the exploitation of ethnic-minority resources, which makes it difficult to build dams. Development of large-scale dams with large environmental and social impacts on local communities, such as the Myitsone Dam, was decided under the military regime without any communication with the local community and completely without transparency. Some EAOs are concerned that dam development may progress further as a result of a ceasefire agreement, as development work has become easier to conduct in areas with peace agreements (Christophersen and Stave, 2018).

The Baluchaung No. 2 Hydropower Plant (also known as the Lawpita Hydropower Station) was constructed in Kayah state as part of the first post-war compensation project conducted by Japan. After the plant began operating in 1960, it was expanded to a total capacity of 168 MW, generating 1,200 GWh of electricity annually. It generated about 14% of total power in Myanmar in 2010 (Japan International Cooperation Agency, Nippon Koei Co. Ltd., and Tokyo Electric Power Company, 2012). The Baluchaung No. 1 Hydropower Plant provides 28 MW and began operating in 1992. The two plants have undoubtedly been vital in providing electric power. In 2014, the independent power producer began operating the Baluchaung No. 3 Hydropower Plant, which had 52 MW of capacity (H. T. Lwin, 2014). The three plants are of

the cascade type, allowing them to use hydropower resources efficiently (Japan International Cooperation Agency, Nippon Koei Co. Ltd., and Tokyo Electric Power Company, 2013).

In the 1960s, however, when operations began under the military regime, the Baluchaung No. 2 plant was located in Kayah state where the Karenni National Progressive Party is active. Initially, the plant did not transmit power locally but only to the cities of Yangon and Mandalay, bringing no benefits to the area. (Since 2015, the plant has provided power to Loikaw in Kayah and Mobye and Phekon in Shan). To build the plant, 1,740 people were forcibly relocated from the site (Kramer, Russell, and Smith, 2018) and received no compensation for the seizure of their land. Residents suffered damage to agriculture and fisheries due to changes in the river basin, were forced to work as security forces for the transmission towers, and suffered injuries from landmines buried around the power plants and transmission towers (Burke et al., 2017). Not only did some residents die or become disabled as the result of stepping on landmines, but if one of their livestock stepped on a landmine and was injured, they were forced to pay the military for damage to the mines (Kubo, 2014; Pyi Pyi Thant, interview, 18 February 2019).

In recent years, more power has been provided within the state and the electrification ratio has exceeded the national average at 77% (Du Pont, 2019). Provision of electric power to nearby villages has become more stable. Wooden utility poles have been replaced with concrete ones. Blackouts caused by strong winds are nearly non-existent and any outages are planned to conduct repairs (Village development committee members, interview, 21 March 2019).

Roads and Bridges

Road construction is highly sensitive and can easily worsen conflict. The military can access an area more easily via the new road, so suspicion of bases built by the Tatmadaw for military use runs deep in EAO-controlled areas. Some are concerned over forced appropriation (without compensation) and forced emigration. On a new stretch of the Asia Highway, which connects Thailand and Myanmar and was built in 2015, a fight broke out between the Democratic Karen Benevolent (Buddhist) Army and the Tatmadaw, resulting in two casualties among the villagers and displacement of over 1,000 people (Downing, 2016; Karen Human Rights Group, THWEE Community Development Network, and Karen Environmental and

Social Action Network, 2016). In the area controlled by the KNU, which signed the NCA in 2018, 2,300 people were displaced as a result of the road upgrade by the Tatmadaw (South et al., 2018). This led to greater distrust on the KNU side (Anderson, 2018). The KNU even left the NCA temporarily in 2018 (Nyein, 2018a). Taking a conflict-sensitive approach and understanding local circumstances is important in road construction.

3.2. Trust Building Through Cooperative Projects

What triggers progress, however incremental, in a peace process? Trust between stakeholders is, no doubt, essential (Johnson and Lidauer, 2014).

Burke et al. (2017) summarise what contributes to the peace process without entrenching conflict:

- Ensure returns for the local people.
- Sufficiently consult local stakeholders, including organizations in conflict with each other.
- Plan in a bottom-up manner and leave decision making to the locals, or enhance local authority and develop capacities so that decision making can be entrusted to them.
- Ensure that the standard of living is improved.
- Ensure that the scheme aligns with the framework for the peace process.[3]
- Prevent aggravation of points of dispute (e.g. language education for the ethnic minority).
- Ensure that one side is not gaining any military benefits (e.g. by constructing roads to conflict areas).

[3] The NCA states in Chapter 6, Article 25 that a signatory EAO has responsibilities related to (i) health, education, socio-economic development; (ii) environmental conservation; (iii) efforts to preserve and promote ethnic culture, language, and literature; (iv) peace and stability, maintenance of rule; (v) receipt of aid from donors for regional development and capacity building; and (vi) permission for the execution of a project related to eradication of illicit drugs (The Nationwide Ceasefire Agreement Between the Government of the Republic of the Union of Myanmar and the Ethnic Armed Organisations, 2015).

- Accept a diverse system, respect existing service providers, and consider collaboration.

Through aid, local people can experience the dividends of a peaceful relationship between the state, EAOs, and ethnic communities, and may improve grassroots collaboration. A project managed with the cooperation of all will prevent resentment that may result from some parties benefiting at the expense of others (Jolliffe, 2014). A health sector initiative has been successful, whilst efforts are also under way for education.

Health

Cooperation in the healthcare sector between the government and healthcare providers in rural or ethnic-minority areas would improve standards of care and lead to increasing trust amongst stakeholders, which, in turn, would promote peace (Tang and Zhao, 2017). Specifically, with coordination assistance from the United Nations Children's Fund (UNICEF), the government cooperates to provide vaccination services with CSOs that are also fully supported by EAOs and local communities in EAO-controlled areas (United Nations, 2016).

Education

Some fear that education efforts will encourage conflict (Christophersen and Stave, 2018). In particular, education in ethnic minorities' own language is a critical problem. The government has approved education in ethnic languages, if needed, in Article 43 of a 2015 amendment to the National Education Law (Union of the Republic of Myanmar, 2014), starting from the primary level (Article 44). Before this law, primary education was officially conducted entirely in Burmese. Formal teaching staff in official schools continue to be predominately Bamar and the government sends them to ethnic-minority areas. However, ethnic-minority areas have a chronic shortage of teaching staff, and villagers, at their own expense, may hire staff to fill vacancies with people of the same ethnic group (Johnson [anonym], member of an international CSO, personal communication, 12 February 2019). Since 2018, five of the seven state governments have been developing a curriculum for teaching ethnic-minority languages in school (Salem-Gervais and Raynaud, 2019). Education in ethnic-minority languages is in

high demand amongst EAOs, and the discussion to coordinate government systems and existing ethnic-minority schools has just begun (Hirschi, 2019).

3.3. Energy-access Projects

Distributed Renewable Energy Sources

Distributed power generation is expanding because prices of solar panels and batteries are falling. The International Renewable Energy Agency (IRENA) reports that 63% of the generated electricity needed to achieve universal electricity access by 2030 is being supplied by off-grid electrical sources (mini-grid, 44%; stand-alone system such as SHSs, 19%) (IRENA, 2017).

- Solar Home Systems

An SHS combines a solar panel, a battery, and a controller, and has a battery charge port for mobile phones. A solar panel is installed on the roof of a residence for uses such as lighting by wiring the panel to the indoors. A particularly small system called a solar lantern features a light and consists of a charge port, a small solar panel, and a battery. More expensive models include larger-capacity solar panels and batteries and can power radios, small televisions, and DVD players.

- Mini-grid

A mini-grid is a system in which small-scale power stations such as solar, small hydropower, and biomass are connected to one or several villages by a grid. In rural areas with sparse populations, the extension of bulk transmission networks is often cost- and time-inefficient. A mini-grid can be an effective solution in such cases. Whilst it depends on the capacity of a power plant and its backup (battery and diesel generator), a mini-grid allows the use of equipment that consumes more electricity than an SHS, thus enabling productive use in addition to household uses.

Electrification by Distributed Power Sources

Distributed power generation is an effective approach to electrification and has fewer elements that might encourage conflict than the extension of a bulk transmission network in ethnic-minority areas.

The main grid is under the government's jurisdiction. Power generation that connects to the main grid is under the MOEE's jurisdiction. Transmission of over 33 kV is managed by the MOEE, whilst 11 kV distribution lines are managed by the state and region governments. The 400 V distribution line is managed by the communities themselves (Du Pont, 2019). Urban residents who live close to a distribution line are required to pay only a connection fee, whilst villagers need to bear the cost of the transformers, as well (Aung Myint, interview, 21 February 2019). The cable fee for a single village to connect to a grid is $20,000/mile, a medium-voltage cable through which several villages can connect to a grid costs $35,000/mile, a transformer for a single village costs over $10,000, and the connection fee for a household is $150–$800 (Langre, 2018). The current main grid extension worsens inequality.

In main grid extension, large-scale work cannot be avoided. It tends to be viewed with suspicion: it is perceived as seeking to expand the central government's authority. Connection to a grid can benefit the local people directly but it is inevitably seen as a government-led project. An extension of the grid to an EAO-controlled area requires sensitive adjustment and the project may become a long-term initiative. Distributed power generation, however, can be introduced independently of the central government. In reality, however, and particularly when foreign institutions are involved in implementing the project, adjustment and coordination with the state government and the EAO are done in advance (Jones and Young [anonym], members of an international CSO, personal communication, 13 November 2018).

Given that villages in ethnic-minority areas are often in mountainous areas where houses are sparse, SHSs may be more appropriate than a mini-grid for initial electrification (Young [anonym], member of an international CSO, personal communication, 13 November 2018). In contrast to rural villages in Bamar, which are in the central dry zone, ethnic-minority villages are often in high altitudes. This is in part because states where ethnic minorities live are in peripheral mountainous areas, and in part because the Tatmadaw burned down the villages when the villagers were thought, wrongly or rightly, to be cooperating with the EAO

during a conflict, and houses were more easily burned down if they were concentrated in one location (Jackson [anonym], member of an international CSO, personal communication, 10 December 2018). Ethnic minorities then moved to more inaccessible areas in the mountains. Installing a distribution line to these homes would be expensive.

National Programmes Related to Energy Access

Table 2.5 shows projects related to energy access in ethnic-minority areas.

Table 2.5: Energy-Access Projects in Ethnic-Minority Areas

	Period	Total Amount	Notes	Donor
NEP	2015–2021	USD$527 million	Grid extension: US$321.25 million Off-grid electrification: US$172.00 million Technical assistance: US$20.00 million Contingent emergency response: US$13.75 million	World Bank
NCDDP	2012–2021	US$535.5 million[4]	Transport: 53% Education: 14% Water and sanitation: 12% **Electrification: 9%** (by cumulative number of sub-projects by the end of FY 2018/19)	World Bank, Italy
Electrification project in Kayin state and eastern Mon state	2016–2019	US$4.5 million[5] (JPY495 million[6])	SHS installation, technical assistance to operators and villagers	Japan
Smart Power Myanmar	2018–		The facility was established in 2018. It is managed by Pact, a CSO.	The Rockefeller Foundation, World Bank, United States Agency for International Development (USAID), and Yoma Strategic Holdings
The Barefoot Project	2017–2019	US$400,000		Denmark, India, Finland, Energy and

[4] Total of community block grants (US$356.55 million), facilitation and capacity development (US$100.00 million), knowledge and learning (US$6.00 million), implementation support (US$54.00 million), emergency contingency response (US$18.95 million) (Bradley, 2019).

[5] US$1 = JPY110.201 (XE.com, 2019).

[6] Total of four projects.

				Environment Partnership
Renewable energy support in Kayin state	2018–2019	US$100,000		Denmark, Sweden, European Climate Foundation

Sources: World Bank (2019), NCDDP (2017), , NCDDP (2018a); NCDDP (2018b), Ministry of Foreign Affairs of Japan (2018), Pact (2018), WWF (2018), Myanmar Energy Monitor (2018), and Thit (2018).

- National Electrification Project

The NEP aims to achieve universal access by 2030 through on- and off-grid electrification (World Bank, 2019). For off-grid efforts, subsidies are provided to implement mini-grids, and SHSs are distributed. On-grid efforts are handled by the MOEE, whilst off-grid efforts are managed by the DRD. As of September 2018, mini-grids were implemented only in Burmese areas (Rodriguez and Lewis [anonym], ministry official, personal communication, 13 September 2018). SHSs are limited to regions controlled by the government (Young and Jones [anonym], member of an international CSO, personal communication, 13 November 2018).

- National Community Driven Development Project

The National Community Driven Development Project (NCDDP) aims to improve rural communities' access to small-scale basic infrastructure and services. The community itself decides what is implemented or rehabilitated and decides how the funds are used (NCDDP, 2017). The NCDDP states that it targets conflict-affected townships and considers villages that are not registered with the government as ideal sites for its projects (World Bank, 2016). However, out of approximately 40,000 total sub-projects in the 6 years leading up to FY 2018/19, transportation-related infrastructure such as roads, bridges, footpaths, and jetties accounted for over half of the projects, but electrification projects for less than 10% of the total (NCDDP, 2018b). Details such as whether the electrification project is on- or off-grid are not shown (Bradley, 2019; NCDDP, 2018a; NCDDP, 2018b). Table 2.6 shows the number of electrification sub-projects in ethnic-minority areas.

The NCDDP has a favourable reputation because of its community-oriented approach, whilst some are concerned about the quality of the infrastructure projects because Myanmar has an insufficient number of engineers (Tsuji, interview, 16 February 2019).

Table 2.6: Electrification Sub-project in Ethnic-minority Areas (number)

State	Number of electrification sub-projects (township)
Kayin	2 (Kyerinseikgyi)
Chin	1 (Tonzan) 12 (Matupi)
Mon	3 (Bilin) 6 (Chaungzon) 6 (Paung)
Rakhine	4 (Ann)
Shan	13 (Namhsan) 5 (Mabein)
Tanintharyi region	2 (Tanintharyi)
Kachin	0
Kayah	0

Source: Lee [anonym], ministry official, email (2 November 2018).

Electrification Projects in South-east Myanmar

The BHN Association, an international NGO, installs SHSs in parts of KNU-controlled areas in Kayin and Mon states. The project is funded through the Grant Aid Project of the Government of Japan in partnership with the Nippon Foundation, and manages the selection of contractors through a bidding process, arrangement, and monitoring after completion, whilst villagers are trained in the basics of using electricity. Volunteers are solicited from amongst the villagers to operate and maintain SHSs in current and future target villages and dispatched to installation work (Ministry of Foreign Affairs of Japan, 2018).

- Smart Power Myanmar

The facility, established by Pact and The Rockefeller Foundation, aims to mobilise funds to support the rollout of mini-grids and other solutions through public–private partnerships for rural electrification. Other founding members of the facility are the World Bank, the United States Agency for International Development (USAID), and Yoma Strategic Holdings (Pact, 2018).

- The Barefoot Project

SHSs are provided to rural households, and women in villages are trained to install and maintain them. The project aims to empower women, as well (WWF, 2018). The project is for 2 years (2017–2019), with a budget of around US$400,000 (Manandhar, email, 6 June 2019).

- Renewable Energy Support in Kayin State

WWF and the Kayin state government signed an MOU for advisory assistance on renewable energy planning (Myanmar Energy Monitor, 2018; Thit, 2018). The term is for 1 year, during 2018 and 2019, and the budget is around US$100,000 (Manandhar, email, 6 June 2019).

4. Stakeholder Perspectives

This study relied on semi-structured interviews, which are open frameworks that enable communication in both directions through conversations. Unlike questionnaires, detailed questions do not need to be prepared if mutual associations between topics are clearly identified before the interview. Questions can be added during the interview and flexibility is afforded to both the interviewer and interviewee (Food and Agriculture Organization of the United Nations, 1990).

Given that the study involved sensitive matters such as peace processes and conflict, the authors conducted open interviews or engaged in conversation when the semi-structured form was difficult to follow or when topics were too difficult for the interviewee. Table 2.7 shows the list of interviewees. Open and semi-structured interviews were conducted on 10–14 September and 3–13 December 2018, 10–23 February and 19–23 March 2019, in Yangon; Nay Pyi Taw; Hpa-an (the capital of Kayin state); Ah Lel Chaung village tract, PhoungPyar village, Lawksawk township (Burmese: Yatsauk) township, Taunggyi district, Shan state; and Ngwe Taung village, Ngwe Taung village tract, Demoso township, Loikaw district, Kayah state. Additional interviews were conducted in person and via Skype in Tokyo, Japan, during the same period. Interviewees from local CSOs were active primarily in Kayin state and south-east Myanmar. In Kayin, the dominant EAO was the KNU, which was a leading EAO amongst the NCA signatories. International CSOs have been more active in Kayin than in other areas

and were able to conduct interviews with multiple stakeholders there. The interviewees include those in charge of the overall peace process.

Table 2.7: Interviewees

	Semi-structured	**Unofficial/Open**
Myanmar government officials	1	3
Foreign government officials		2
International CSO members	8	11
Local CSO members	6	1
International organisation members	1	1
Academia members	2	
Village committee members		6
Total	18	24

5. Findings and Conclusions

Energy access is the key issue to be resolved. To achieve universal access, peripheral areas with ethnic conflicts need to be electrified. Ethnic-minority and rural Bamar areas have endured unequal energy access, which has not been discussed widely. National programmes such as NEP off-grid electrification can reach government-controlled areas but may have difficulty going into EAO-controlled areas, where ethnic-minority CSOs have worked to improve villagers' livelihoods. Some local CSOs have provided social services but not energy and electricity.

Regrettably, energy has often been associated with resource exploitation because of experiences with large-scale hydropower development in conflict contexts. However, technological innovations make off-grid renewable power sources more affordable. SHSs are easy to deploy and not politically divisive. They are used mainly for lighting and mobile-phone charging, which greatly improve people's livelihoods. Mobile phones and social networking services have spread rapidly all over the world, including rural Myanmar. SHSs suit local needs.

The peace process has reached a stalemate and trust amongst stakeholders has not been built. The framework takes a top-down approach, such as the Union Peace Conference and large-scale economic development. A bottom-up approach is necessary. Both sides – the government and Tatmadaw, and EAOs – agree that improving the standard of living of villagers in conflict areas is a matter of great urgency. Livelihood projects not only provide returns to local villagers but also create opportunities to build trust at the grassroots. Collaboration amongst state and region governments, EAOs and ethnic-minority groups, and CSOs is necessary to ensure the success of energy projects. All stakeholders must meet often and remain in constant contact. Frequent meetings are important to build relationships. Stakeholders collaborate in the health sector and they could also develop off-grid renewables. Overall, having multiple connections amongst stakeholders in different sectors is desirable.

The following are our findings from the interviews.

Aid must meet the community's needs.

Aid programmes must understand local needs (South, interview (Skype), 27 March 2019; Williams, interview, 22 February 2019). Local stakeholders need to be engaged and community needs understood thoroughly. Otherwise, a minor malfunction will lead to the project being abandoned.

Trust can be built through bottom-up cooperative projects.

Collaboration between the state government and EAO or ethnic-minority CSO is effective in building trust from the bottom up. Cooperating on 'low-hanging fruit' or areas on which stakeholders can easily agree will foster trust from the bottom up. Initiatives are already under way in health and education, and distributed energy can be another area of cooperation.

Frequent exchange and contact are important.

Cooperative projects create opportunities to meet stakeholders. In Myanmar, frequent face-to-face meetings are important to build and sustain relationships. Relationships based on personal networks are vital for relationships amongst organisations. In addition to the Union Peace Conference, the 21st Century Panglong conference occasionally takes place at top levels. Bilateral meetings that take place frequently at the grassroots are meaningful (Takahashi, interview, 11 March 2019).

Further diffusion of mobile phones assisted by SHSs may reduce the digital divide.

Mobile phones are a necessity, and they need electricity. When asked how widespread mobile-phone use is in rural areas, the interviewees had varied answers. Some said that almost everyone had mobile phones, even in rural areas (Takahashi, interview, 11 March 2019; Tsuji, interview, 16 February 2019; Aung Myint, interview, 21 February 2019; Anderson [anonym], member of a local CSO, personal communication, 9 December 2018). Others pointed out that many people in ethnic-minority villages still did not own phones, and some of those who did had connectivity problems (Allen [anonym], member of a local CSO, interview (Skype), 28 February 2019; Smith [anonym], member of an international CSO, personal communication, 12 February 2019; Young [anonym], member of an international CSO, personal communication, 13 November 2018). In 2017, the overall mobile-phone penetration rate was 81.5%, with an average of 76.6% in rural areas. The gap in ownership rates was likely because of the difference in purchasing power rather than underdeveloped infrastructure (Central Statistical Organization, UNDP, and World Bank, 2018). There were cases where a powerful figure in the village gave away a used mobile phone to a villager (Takahashi, interview, 11 March 2019). Throughout the interviews, the need for mobile phones was pointed out strongly, especially by younger people (Aung Myint, interview, 21 February 2019; Anderson [anonym], member of a local CSO, personal communication, 9 December 2018). Mobile phones and lighting can be charged using solar lanterns. If mobile-phone batteries can be charged using distributed power generation, villagers will no longer need to pay shops the relatively high prices to charge their phones. In line with the global trend, social networks have spread tremendously. Connecting to a social network is not only strongly desired but also believed to help reduce the rural digital divide.

Many SHSs do not last long and need to be improved.

Some interviewees thought that the lifespan of an SHS was approximately 2 years (Tsuji, interview, 16 February 2019; Aung Myint, interview, 21 February 2019; Williams, interview, 22 February 2019). The SHS battery lasts 1.5–2 years (Manhar, Latt, and Hilbert, 2018).

A solar panel battery lasts 25 years or more, lithium 10 years, and lead 4–5 years. However, 2 years is realistic for products available on the market. Since SHSs are affordable, many buyers tend to check whether the light turns on or not at the time of purchase, and believe

they can simply buy a replacement if the product breaks (Aung Myint, interview, 21 February 2019).

Roads must be constructed in consultation with local communities.

Many interviewees pointed out how crucial roads are to village development (Zar Ni, interview, 11 February 2019; Tsuji, interview, 16 February 2019; Takahashi, interview, 11 March 2019; Anderson [anonym], member of a local CSO, personal communication, 9 December 2018). When roads are built and people move in and out of villages, products from the village can be sold in markets and an industry can be created. Social services can be accessed more easily. Some in ethnic-minority areas become isolated during the rainy season. Many communities welcome the construction and upgrades of roads and bridges (South et al., 2018). However, roads can exacerbate a fragile situation. It is important to consider the local context and to facilitate the appropriate consultation process.