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LEBANON'S SOLAR ROLLOUT: IN WHAT WAYS HAS IT BEEN AN UNJUST ENERGY TRANSITION?

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Cover photo: Power ship near Zouk power plant, Lebanon (c) Maher Iskandar, Shutterstock

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Lebanon's national electricity supply has nearly collapsed, with the country's residents experiencing constant power cuts over the past three decades and total blackouts since 2020.¹ This has led residents across the country to find their "coping strategies" - which have become somewhat normalized - to deal with the national shortages, including purchasing or subscribing to diesel generators.² More recently, these coping strategies have started to include solar energy installations, which have been deemed revolutionary for Lebanon,³ although in reality, the story is much more complex. As the climate crisis worsens and global institutions start to advocate and fund just transitions,⁴ it is imperative to reflect on what this means to prevent the repetition of collective injustices. This paper briefly outlines the solar energy landscape in Lebanon and asks some questions about the country's solar rollout, including who benefits from it and how, as well as how this process repeats past energy injustices. It then presents some case studies of initiatives that have addressed some community energy needs while offering lessons for future energy planning. The paper concludes with recommendations to policymakers, civil society organizations, and the private sector as they transition to solar energy.

Background and methodology

Électricité Du Liban (EDL), the main legal entity responsible for generating, transmitting, and distributing electricity, is a weakened public institution. Undermined by the material destruction caused by reconstruction, its power-sharing system created a corrupt, clientelistic, and mismanaged public sector.⁵ The EDL's failure to provide electricity is exacerbated by the national economic crisis that began in late 2019. The inflation rate, which reached at 222% in

2023,⁷ weakened the Lebanese lira and left the national government - which gives money to the EDL with the expectation of reimbursement - unable to purchase fuel. This further worsened the energy crisis. Due to the fuel and diesel shortage, residents nationwide are now experiencing periods of total energy blackouts. The shortage of fuel and diesel also impacted the private companies that supply these products, as they were unable to secure the financing to import fuel and diesel. In short, there was no electricity coming from the EDL because there was no money to import fuel. The private sector was also struggling for the same reason; this challenge was later exacerbated when the government decided to lift fuel subsidies in 2021.⁸

The Beirut Port explosion on 4 August 2020 also destroyed the EDL's main office and assets worth an estimated \$40 to \$50 million.⁹ These assets include its distribution substations, distribution lines, and the billing data center. Some of these stations have been repaired, but a plan to restore all the lost infrastructure has yet to be put in place.¹⁰ EDL has a 40% network loss, in part due to the aging facilities that are in desperate need of upgrading and an annual deficit of approximately \$1.5 to \$2 billion.¹¹ Electricity tariffs do not even cover the actual cost of generating electricity: tariffs average \$0.095 Kwh while the actual cost is about \$0.16 to \$0.23 Kwh.¹² Last year, EDL increased electricity tariffs to \$0.10 per kwh for the first 100kwh and \$0.27 per kwh for anything more; this was the first tariffs hike since the 1990s.¹³

The cost of using generators - the people's coping strategy - is higher than the national electricity, at \$0.34 per kwh.¹⁴ Because of the country's energy landscape, residents have to pay

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2 Dana Abi Ghanem. "Energy, the City and Everyday Life: Living with Power Outages in Post-War Lebanon." Energy Research & Social Science, Elsevier, 26 Nov. 2017, available at www.sciencedirect.com/science/article/abs/pii/S2214629617304012

3 Rouba Bou Khzam. "Lebanon's Solar Revolution." Executive Magazine, 3 Jan. 2024, available at www.executive-magazine.com/special-report/lebanons-solar-revolution

4 IPCC, Ar6 Synthesis Report: Climate Change 2023, available at www.ipcc.ch/report/sixth-assessment-report-cycle/

5 Ali Ahmad et. al., "Dysfunctional to function corruption: the politics of reform in Lebanon's Electricity Sector", The Policy Practice, 2020, available at <https://www.thepolicypractice.com/sites/default/files/2020-12/Lebanon%20electricity%20paper.pdf>

6 Bassel Sallouk. "Taif and the Lebanese State: The Political Economy of a Very Sectarian Public Sector." Nationalism and Ethnic Politics. 2019.

7 Stephanie Bechara, "Lebanon's Inflation Remains in the Triple Digits in 2023." L'Orient Today, L'Orient Today, 23 Jan. 2024, available at today.lorientlejour.com/article/1365438/lebanons-inflation-remains-in-the-triple-digits-in-2023.html

8 Kareem Chehayeb, "'catastrophe' Warning as Lebanese Officials Lift Fuel Subsidies." Al Jazeera, Al Jazeera, 28 June 2021, available at www.aljazeera.com/news/2021/6/28/catastrophe-warning-as-lebanese-officials-lift-fuel-subsidies

9 Executive Magazine, "Incentivize to Energize." Executive Magazine, 14 Nov. 2022, available at www.executive-magazine.com/special-report/incentivize-to-energize

10 Executive Magazine, "Incentivize to Energize."

11 Jessica Obeid, Lebanon: Attempts to Fast-Track Electricity Reform, Castlereagh, 19 November 2019, available at castlereagh.net/lebanon-attempts-to-fast-track-electricity-reform/

12 Jessica Obeid, Lebanon: Attempts to Fast-Track Electricity Reform.

13 Nada Homsy, "Lebanon Raises Electricity Tariff, Lifting Hopes of Increased Power Supply." The National, 3 Nov. 2022, available at www.thenationalnews.com/mena/lebanon/2022/11/02/lebanon-raises-electricity-tariff-raising-hopes-of-increased-power-supply/

14 L'Orient Today, "Generator Tariffs: Price per Kwh Rises in Liras as Well as in Dollars." L'Orient Today, 3 July 2023, available at today.lorientlejour.com/article/1342248/generator-tariffs-price-per-kwh-falls-in-liras-but-rises-in-dollars.html

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two energy bills. To make matters worse, generator owners arbitrarily set the prices in the areas where they operate - despite a 2021 law that requires private generator owners to install meters so subscribers know their consumption and corresponding cost - as well as the timing of when they receive their electricity.¹⁵ According to a national survey of some 1,200 households conducted by Human Rights Watch, one in five of Lebanon's poorest 20% of households does not have access to a generator, mostly because they cannot afford it; more households could afford to have a generator, but that was before the economic crisis.¹⁶ Meanwhile, the diesel generator sector is controlled by around 3,000 to 3,500 owners¹⁷ within the corrupt private generator mafia.¹⁸ The mafias are responsible for exposing Lebanon's residents to massive amounts of toxins from generator fumes, which increased by 300% in late 2021 compared to 2012 levels because of the electricity crisis described above.¹⁹ There are approximately 33,000 to 37,000 generators in Lebanon.²⁰

The failure of the state to guarantee people's right to energy²¹ led to individual efforts to fill the gap out of desperation for energy. A market based on desperation opened up space for the private sector to meet people's needs and, in some cases, took advantage of them. Since 2020, around 1,300 MW of PV capacity has been installed in Lebanon, mostly from small solar and battery systems.²² Most of this is also off-grid. This is a significant increase from the 100 MW recorded in 2020. According to Waleed El-Baba from the Lebanese Solar Energy

Society, the number of companies importing and providing services related to solar technology has grown from 26 companies in 2001 to more than 100 companies by 2019, with an additional 100 emerging after the economic crisis and the end of the fuel subsidies.²³

There have been efforts to introduce new legislation to support renewable energy efforts in Lebanon. One example is the Decentralized Renewable Energy Law (DRE). The DRE, which was passed on 14 December 2023,²⁴ is the most recent solar energy-related law to be passed in the Lebanon parliament. It allows "peer-to-peer" trading of renewable energy, including solar energy.²⁵ What could this law mean in practice? This law allows renewable energy producers in the private sector to sell their electricity, in addition to connecting their respective power systems to the EDL's grid up to 10 MW. It also allows producers to install a net metering system to exchange electricity with the EDL. Buyers and sellers who are located on the same land plot or two adjacent plots do not have to use the EDL grid to transfer electricity. Residents who would use the EDL grid would in turn pay transmission fees. Under this law, these private sector companies can sell electricity to other private companies on the public grid through peer-to-peer contracts. According to a Business News interview with Lebanese Center for Energy Conservation (LCEC) President Pierre El Khoury, "buyers and sellers of renewable energy will be able to set any price they agree on, provided it is below a ceiling set by the Electricity Regulatory Authority (ERA) once it starts operations after its board of directors is nominated." He adds that "Monopolistic practices will not occur since buyers can purchase electricity from any seller they want across the country as they will get it through the EDL grid."²⁶ The law has yet to be implemented and is awaiting the launch of the ERA, which is waiting for the authorities to appoint the ERA's board.

Why does this matter? Three people interviewed for this report said that the most effective way to access the right to energy is to have a strong national capacity for it. For example, Elie Romanos from the Arc En Ciel highlighted the importance of the solar rollout being connected to the national grid. He said, "All the solar system growth should have happened without batteries, if there was a clear plan to have on-grid systems would be the best solution. Instead of the batteries, we could have used that money to expand [the grid]...That way, those who are unable to invest in solar systems can still have access

15 Adham Nasser, "No Power to the People: How Private Generator Owners Own Lebanon's Electricity." Raseef22, 27 Apr. 2023, available at raseef22.net/english/article/1092975-no-power-to-the-people-how-private-generator-owners-own-lebanons-electricity

16 Human Rights Watch, "Cut off from Life Itself." Human Rights Watch, 27 Oct. 2023, available at www.hrw.org/report/2023/03/09/cut-life-itself/lebanons-failure-right-electricity

17 Richard Salame, "Lebanon's Generator Sector: The Known Workings of a Once Illegal, Largely Unregulated Industry." L'Orient Today, 21 Dec. 2021, available at today.lorientlejour.com/article/1285477/lebanons-generator-sector-the-known-workings-of-a-once-illegal-largely-unregulated-industry.html

18 Thomas Schellen, "The Race to Solar." Executive Magazine, 15 Nov. 2021, available at www.executive-magazine.com/special-report/the-race-to-solar

19 L'Orient Today, "Researchers Estimate a 300 Percent Increase in Toxic Emissions Due to Generator Use in Electricity Crisis." L'Orient Today, 1 Nov. 2021, today.lorientlejour.com/article/1280014/researchers-estimate-a-300-percent-increase-in-toxic-emissions-due-to-generator-use-in-electricity-crisis.html

20 Ali Ahmad, "Distributed Power Generation for Lebanon", World Bank. <https://documents1.worldbank.org/curated/en/353531589865018948/pdf/Distributed-Power-Generation-for-Lebanon-Market-Assessment-and-Policy-Pathways.pdf>

21 Human Rights Watch, "Cut off from Life Itself."

22 Ilias Tsagas, "Lebanon introduces Peer to Peer Renewable Energy Trading", PV-Magazine, 2 Jan. 2024, available at <https://www.pv-magazine.com/2024/01/02/lebanon-introduces-peer-to-peer-renewable-energy-trading/>

23 Thomas, Schellen. "The Race to Solar."

24 National News Agency, "Parliament Approves Renewable Energy Generation Draft Law", 14 December 2023, available at <https://www.nna-leb.gov.lb/en/politics/662515/parliament-approves-renewable-energy-generation-dr>

25 Ilias Tsagas, "Lebanon introduces Peer to Peer Renewable Energy Trading"

26 Business Insider, "Decentralized Renewable Energy Approved", 21 December 2023, available at <http://www.businessnews.com.lb/cms/Story/StoryDetails/11245/Decentralized-renewable-energy-generation-approved>

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to electricity at an affordable price. Instead, we created more waste and even more energy injustice in the country.”

Unfortunately, people have lost trust in the government and are afraid to connect to the grid, be it on a decentralized or national level. As Bechmezzine Mayor, Fawzi Kalash, described, “Some people are getting scared of putting the energy back on the grid”. He added, however, that the loss of energy is unfortunate, citing an example of a household that has installed solar panels but only comes to their house over the weekends. “That is five days of energy wasted.” In fact, rooftop solar PV mostly relies on off-grid systems, including battery systems i.e. a significant amount of electricity produced is wasted when the batteries are charged.²⁷ In an interview with Beit Mery's mayor, Roy Abou Chedid, he mentioned that one of their solar energy projects was discontinued due to the lack of a law such as the Decentralized Energy Law. At the time of the interview in late fall 2023, the law was not yet passed. The hope of this law is that with more renewable energy connected to the grid, the supply of electricity to residents would increase.²⁸ Unfortunately, based on current estimates, the DRE law will not give Lebanon's residents full access to electricity, unless the national grid is electrified for at least 18 hours.²⁹

Another factor impacting the solar rollout is Israel's bombardment of Gaza and Lebanon. Since 7 October 2023, Israel's bombardment of Gaza and its continued open military front in Lebanon - mostly in the southern regions - have added yet another injustice to Lebanon's energy and solar landscape. The Israeli army has also explicitly targeted energy infrastructure, including solar panels.³⁰ Military aggression typically strikes where the lifelines are, be it water infrastructure, healthcare providers, or educational institutions. One example of such attacks on solar projects is in Tair Harfa in the South of Lebanon.³¹ The community spent a year getting this project off the ground, using 200 of the 540

WM panels to pump water from a local well. More than 400 people in the village were connected to the water system and paid \$3 per month for the service. The Israeli army destroyed it on 3 November 2023. Members of the community started a new go-fund me to replace the destroyed infrastructure.³²

So how is this shift manifesting itself on the ground in Lebanon in terms of solar energy justice?

To be clear, what is happening in Lebanon is not a national transition, nor is it an “energy revolution” - these are collective endeavors against the fossil fuel economy. What we are seeing is that so much of the solar energy rollout is based on individual and privatized efforts but the need for the highly polluting diesel generators remains.³³ There is also a limit to solar expansion. In fact, installation is now plateauing.³⁴

However, the shift to solar coincides with the global energy shift away from fossil fuels to counter the worst-case effects of the climate crisis. The Lebanon government, a signatory to the Paris Agreement, has pledged in its National Determined Contributions (NDCs) commitment to sourcing 30% of the country's energy from renewable energy sources by 2030.³⁵ These sporadic initiatives could eventually contribute to better national efforts for access to energy.

Methodology

There is ample research conducted on the solar boom in Lebanon, especially in the last four years. The purpose of this paper is to outline how this solar rollout could be understood under the just transition umbrella. The research is based on desk research and interviews with 13 stakeholders, including municipalities, energy experts, and civil society organizations working on solar energy. The municipalities interviewed included Sour, Tripoli, Bechmezzine, Mar Chaaya, and Beit Mery, representing urban contexts in the north and south of Lebanon, and rural contexts in the north and Mount Lebanon. The paper also builds on input from a roundtable discussion held in Beirut on 19 March 2024 with policymakers on the local and national levels to validate the main findings.

27 Ilias Tsagas, “Lebanese households fight economic crisis with record rooftop solar PVs”, PV-Magazine, 8 June 2023, available at <https://www.pv-magazine.com/2023/06/08/lebanese-households-fight-economic-crisis-with-record-rooftop-pv-additions/>

28 Business Insider, “Decentralized Renewable Energy Approved”

29 Connor Kalso, “The Scramble for Solar: Safety & Environmental Concerns Loom over Renewable Energy”, Badil, 19 Aug. 2022, available at <https://thebadil.com/analysis/solar-safety-environmental-concerns-renewable-lebanon/>

30 Sally Abou AlJoud, “From Pride to Ruin. Israel Shatters Self-Financed Solar Microgrid Supplying Water to Souther Village”, L'Orient Today, 16 Nov. 2023, <https://today.lorientlejour.com/article/1357597/from-pride-to-ruin-in-israel-shatters-self-financed-solar-microgrid-supplying-water-to-southern-village.html>

31 Angela Skujins, “Self-financed solar array destroyed in Lebanese farming village”, PV-Magazine, 21 Nov. 2023, available at <https://www.pv-magazine.com/2023/11/21/self-financed-solar-array-destroyed-in-lebanese-farming-village/>

32 GoFund Me Campaign, “Rebuild Tair Harfa's Solar Power System”, available at https://www.gofundme.com/f/rebuild-tair-harfes-solar-power-system?utm_campaign=p_lico+share-sheet-first-launch&utm_medium=more&utm_source=customer

33 Julia Choucair Vizoso, Yara Al-Murr, “Privatising the Sun: The Dark Side of Lebanon's “Solar Revolution”, The Public Source, 11 October 2022, available at <https://thepublicsource.org/lebanon-solar-privatization>

34 Sally Abou AlJoud, “Experts weigh in: Why is Lebanon's solar ‘boom’ no longer booming?”, L'Orient Today, 13 May 2024, available at <https://today.lorientlejour.com/article/1413635/experts-weigh-in-why-is-lebanons-solar-boom-no-longer-booming.html>

35 IRENA, “Renewable Energy Outlook: Lebanon”, IRENA, June 2020, available at https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Outlook_Lebanon_2020.pdf

4 Lebanon's Solar Rollout: In What Ways Has It Been an Unjust Energy Transition?

What Is Solar Energy Justice?

The Just Environmental Transition (JET) is a proposed framework for addressing polluting industries that is evolving as a solution to the global ecological and climate catastrophe. As the transition away from fossil fuel energy continues - though not nearly fast enough considering the magnitude of the climate crisis - there are ongoing global debates about renewable energy justice and what that means under the JET. There are many components to these debates, including understanding the dynamics between renewable energy and political control, analyzing the nuances of democratized energy planning, and observing the ramifications of democratic renewable energy on a practical level.³⁶

The Environmental Politics Program at the Arab Reform Initiative considers a just transition to be one that is fair, equitable, accountable, just, and inclusive in its rollout. Under the just transition umbrella, this paper asks the following questions in an attempt to understand the ways in which solar rollout in Lebanon contributes to an unjust transition, especially in light of the country's historically marginalized communities, including low-income Lebanese, Palestinian and Syrian refugees, migrant workers, semi-nomadic communities, and stateless persons.³⁷ Inspired by the Energy Justice Scorecard of the Solar Justice Initiative, an organization that provides legal and policy resources to advocates and policymakers to advance local and state transitions to equitable clean energy,³⁸ this paper assesses the solar energy rollout based on the following:

- **Decision-making process:** Did marginalized communities participate in the policy-making process? Does the policy prioritize the decision-making of marginalized communities?
- **Benefits and access:** Does the policy improve economic, social, or health benefits for marginalized communities? Does the policy make energy more accessible and affordable for marginalized communities?

36 Matthew J. Burke, Jennie C. Stephens, "Political power and renewable energy futures: A critical review", *Energy Research and Social Science*, Volume 35, January 2018, pg. 75-93.

37 There are multiple layers to these questions in relation to the growing solar sector in Lebanon and this paper only gives a broad overview.

38 The scorecard was made for "Guidance Rooted in Energy Justice". The Scorecard aims to support stakeholders that are part of energy transitions to assess if policies include energy justice principles, particularly those of procedural and distributive justice. It is part of an Energy Justice workbook, which the Solar Justice Initiative designed to address questions that often come up with regards to equity and energy policy. It has mostly been used in the North American context, particularly frontline communities, justice-based organizations, and policymakers that prioritize equity in a just transition to renewable energy.

- **Restoration:** Does the policy aim to remedy past and present harms to communities negatively impacted by the energy system?³⁹

Process and decision-making

Did marginalized communities participate in the solar rollout process? Does the solar rollout prioritize the decision-making by marginalized communities?

Mostly no. It is those with resources who appear to make the decisions. As Julien Jreissati from Greenpeace MENA said at the ARI expert roundtable, "There simply was no process." Since there is no process, there is little space to include marginalized communities in "the process". In the five municipalities interviewed, it is reiterated that the solar technologies rollout is catalyzed on an individual level, not as part of a larger, collective project.

In some cases, those with the financial and political means to care about equity questions have designed projects to benefit a larger community, like specific mayors. This was the case of the Bechmezzine municipality; their solar projects are funded by international aid donors, but the local authority has a say about who, or where, the energy goes. For example, the mayor deliberately targeted the energy to low-income residents of his municipality, based on who was receiving social support from the Ministry of Social Affairs. Another similar case is a solar project in Tripoli funded by a member of the Lebanese diaspora; low-income residents in Tripoli now have access to energy because this donor wanted to support his community and volunteers identified the needs and opportunities there (both cases are discussed in more detail below).

There have been some cases where humanitarian and aid agencies have installed solar energy targeting marginalized groups (e.g. UNHCR, UNICEF, Greenpeace, Direct Relief). These are laudable efforts but remain individualistic and have contributed to the asymmetry in energy access. There have also been efforts to fund solar projects based on the needs of the local Lebanese communities, but unfortunately, two of the interviewees highlighted that on the ground, the marginalized communities were used as tokens for the aid to come in - and in one case, the presence of refugee communities was fabricated to meet aid requirements - and the aid did not actually reach these same communities. Similarly, in the cases of donor-funded solar projects, interviewees noted that the donors - rather than local authorities - select the solar companies to work with. This also poses a challenge for the beneficiaries of such projects, as they do not have direct contact with the companies - especially if they are geographically distant,

39 Harms, in this context, is mostly the lack of energy access, in addition to exposure to pollution due to energy generation.

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which adds a layer of inconvenience to the process when they experience problems with their solar technology. This is in contrast with the individualized household solar rollout, where each consumer was able to choose the company, they wanted to work with. In an interview with one of the mayors, he said that residents choose solar companies “based on their knowledge and connections. There is a randomness - in Lebanon when something succeeds, it flourishes. Everyone becomes an expert in it...The choices are random.”

All of the interviews with the municipalities gave the same response concerning the number of households and solar energy capacity installed: they do not know because installations are not documented. One mayor said one can estimate by going from building to building and counting the panels and asking the residents, but this is time-consuming, and the municipality does not have the human and material resources to do this consistently. It is especially difficult to do so in an urban environment. He scoffed at the national figures used to describe the solar capacity installation across the country when they cannot get accurate figures in their municipalities. Another mayor described how there are cases of people installing solar panels on their roofs at night, and it is less likely to be interrupted for violating the law of public spaces that require building approvals.

Another layer to this process is that the applicants need to get full approval from the rest of the building's residents (those who own their apartments) before installing solar PV on their roofs. Two interviewees (one with a mayor and another with a municipal employee) repeated that it is illogical to require the full approval from the building owners, especially since the residents who own their apartments still have the space to which they are entitled; that is, if someone is installing solar panels on the roof, it should be installed in such a way that the other residents' space on the roof is preserved. One mayor described this process as yet another obstacle to making the solar rollout sound and equitable. This same mayor described a case where one well-meaning resident suggested installing solar for the entire building, with a payment plan that would be less than paying for the generator (i.e. hopefully beneficial for everyone). The rest of the building ended up rallying against him with the fury of “What? He's trying to sell us the sun?” The mayor said this and stressed the importance of raising awareness about solar energy. Although the argument against this collective approval process is well known, the fact remains that even without an approval, the more well-off residents simply take advantage of the better spot on the roof, while assuming that their neighbors cannot pay for solar panels and, therefore, do not need their roof space.⁴⁰

Diaspora communities help these projects come to fruition, as mentioned in the interviews with the municipalities of

Sour, Bechmezzine, and Tripoli. Members of the diaspora have been supporting immensely with bringing energy to their hometowns and cities, including to some of the marginalized communities in their hometowns (mostly low-income Lebanese).

Benefits and Access

Does the solar rollout center the economic, social, or health benefits of the marginalized communities? Does the policy make energy more accessible and affordable for marginalized communities?

Again, yes and no.

Economically

To begin with, without electricity, there is little room for economic movement, let alone prosperity. As the energy governance specialist Diana Kaissy reminded us in the ARI expert roundtable that ARI organized, “Without energy, there is no economic growth.” Solar energy has economically benefited all those who are connected to solar infrastructure on two levels: in terms of saving money by disconnecting from the diesel generator, and in terms of being able to continue working in their businesses. The Bechmezzine mayor described how certain within his area stopped relying on generator subscriptions altogether after the implementation of solar PV; the generator owners were furious because they were losing customers and their source of income.

In Sour, the mayor described how some guesthouses teamed up and decided to create a shared solar energy network to collectively maintain their daily operations. Their generators are there for backup, but they try to avoid it because it is “bad for the hospitality business” to hear the humming of the generators. In this case, the local community - including its marginalized members - is not positively impacted because the energy benefits are limited to visitors of these guesthouses and the businesses themselves.

When asked about the general benefits, Sour's mayor said, “The ones who can quickly benefit are those who have \$5,000 or more in their pocket.” While that is largely true, some are selling personal items, such as gold or jewelry to afford the upfront cost of solar, while others are digging into what remains of their savings or channeling the remittances from close friends and family abroad to invest in solar.⁴¹ Others take out informal loans from family and friends or borrow from

40 Ebla Research Collective, “Building Committees as Space of Organizing in Beirut”. February 2024, available at <https://eblaresearch.org/2024/03/read-our-research-report/>

41 Ilias Tsagas, “Lebanese households fight economic crisis with record rooftop solar PVs”; Sally Abou AlJoud, “Lebanese families sell wedding jewelry, take on debt for solar panels”, L'Orient Today, 22 Jan. 2024, available at https://today.lorientlejour.com/article/1365281/lebanese-families-sell-wedding-jewelry-take-on-debt-for-solar-panels.html?_gl=1*1kiblfh*_gcl_au*MTE3NjI3NzczMi4xNzA2MTE1MTMx

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money-lending institutions, like Qard El-Hassan, a financial institution linked to Hizballah, a political party in Lebanon. For instance, Qard El-Hassan provided 20,000 loans in 2022 to finance solar energy.⁴²

Health

The health and ecological benefits in this context mean less exposure to fumes and noise pollution from diesel generators, which are mostly placed outside the parameters of health regulations, i.e. close to residential housing.

Otherwise, the health of the workers who dispose of the solar battery technologies, who are often children, migrants, and refugees, has been harmed.⁴³ In an interview with Elie Romanos from Arc En Ciel's Environment Program, he stressed the dangers that come with the waste of solar technology, particularly the batteries and panels. "The waste is significant...Solar energy is a significant contributor to waste, but this growth is going to be in the short to medium term. Everything we put up in terms of solar will be waste in 20 years." Unfortunately, in the Lebanese context, the batteries have a shorter lifecycle because they are drained more often than in contexts with more reliable energy.

Romanos also talked about the batteries that arrive at the recycling facilities without the acid because the facilities do not have the capacity to treat the acid in the batteries. He adds that he is not sure how the acid is being disposed of, which is dangerous and poses hazards to the people and ecologies exposed to the battery acid. "There are thousands [of acid dumps], but we don't know them all. Sometimes they are dumped in the sewage system, in the soil, in the river. Anywhere." In fact, solar panels and their batteries contain toxic materials and heavy metals. If not properly disposed of, these materials could present significant harm to the ecologies in Lebanon, including its groundwater and soil.⁴⁴ One calculation based on 2023 survey data estimates that around 500,000 batteries would need to be recycled in the coming few years,⁴⁵ highlighting the urgency to address this.

42 Zeina Antonios, "Disapproval as Al-Qard Al-Hassan arrives in Souk al-Gharb", L'Orient Today, 15 March 2023, available at <https://today.lorientlejour.com/article/1331567/disapproval-as-al-qard-al-hassan-arrives-in-souk-al-gharb.html>

43 Julia Choucair Vizoso, Yara Al-Murr, "Privatising the Sun: The Dark Side of Lebanon's "Solar Revolution".

44 Connor Kalso, "The Scramble for Solar: Safety & Environmental Concerns Loom over Renewable Energy" Badil. <https://thebadil.com/analysis/solar-safety-environmental-concerns-renewable-lebanon/>

45 World Bank, 'Study on Beneficiary Multi-Tier Framework: Baseline Survey and Market Assessment of The Low Carbon Energy Value-Chain' (forthcoming).

Discrepancies in regional benefits

Rural areas are better placed to benefit from the decentralized solar rollout than urban areas because there is a smaller number of people and more space for bigger solar projects; solarization rates are higher outside the urban context.⁴⁶ Given that the large majority of Lebanon's residents live in cities (estimated at 89% in 2018), this alone illustrates the asymmetry of the solar benefits.⁴⁷ There is simply not enough space for urban residents to benefit from the rollout in its current form.

The dynamics are different in more constricted housing, including in informal housing or refugee camps. One example is in Burj El Brajne. In an interview with the anthropologist and development researcher Zeina Abla, she described how some residents have solar panels that meet their electricity needs when the sun is out but have no space for batteries, which means any benefits end the minute the sun sets. This becomes an obstacle to any work that takes place in the evening, like domestic labor, home businesses, and children's school homework. This highlights that solar PV alone is not a solution, and the need to rely on fossil fuels remains (or in this case the need for diesel generators for those who can pay the price).

The role of the private sector in harm

Interviewees also described the role of companies and the private sector, many of them are reaping the full benefits of the solar potential. Despite the improper hardware and installation,⁴⁸ there is little accountability or consumer protection/insurance for the solar technology installed. Of course, some are better than others. Our interviewees describe that the cheaper the panels are, the worse the quality. In some cases, this leads to fires. The Mar Chaaya mayor Najib El-Hajj described a fire in his town caused by faulty wiring in a home that could have burnt the entire building if the neighbors had not noticed (the solar owners were out of town). Although the incidences of fires are not too common, they do happen and are dangerous; most of them

46 World Bank, 'Study on Beneficiary Multi-Tier Framework: Baseline Survey and Market Assessment of The Low Carbon Energy Value-Chain' (forthcoming).

47 World Bank, Urban Population Lebanon (% of population), 2018, available at <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=LB>

48 Connor Kalso, "The Scramble for Solar: Safety & Environmental Concerns Loom over Renewable Energy".

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occur in the summer due to overvoltage from “improperly calibrated PV systems”.⁴⁹ According to Walid El-Baba, a co-founder of the Lebanese Solar Energy Society, about 30% of solar installations have problems.⁵⁰ Some people buy solar with regular maintenance as this is what the company offers, while others only get support when something goes wrong. What determines the difference is their awareness as consumers or the financial capacity to pay for better services.

There is also concern for residents who may be underserved or put at risk by solar suppliers who do not do their due diligence during installation. One example is that suppliers may mount the solar panel carriers badly, increasing the risk of the panels falling off a rooftop and causing dangerous accidents.⁵¹ In fact, El-Hajj described a similar situation in his municipality; a panel was torn off a rooftop onto a car in windy weather, causing considerable damage to the vehicle. There was no accountability for the accident. According to the mayor, the owner of the solar panel did not want to admit that the panel came from him, adding that the company should take responsibility under the one-year warranty. In this case, the company told him that their guarantee covers any technical issues, “not natural issues”. The municipality ended up taking responsibility and repairing the damage to the car. because of this case, residents who install solar panels were now expected to sign a commitment document (تعهد) that they are responsible for anything that goes wrong with their panels.

Benefits and disadvantages of solar water-pumping

“Solar water pumping is a lot like space on a roof for solar panels [...] essentially if I am the rich person or I am the fortunate person for whatever reason, to get my panels up on the roof first, khallas. There is a finite amount of space, just like there is a finite amount of groundwater that these wells are tapping into. “ -Sammy Kayed, Environmental Activist & Researcher

One of the benefits of the solar rollout has been access to water, be it for those working in agriculture or people in regions that do not have access to water for domestic use.⁵² This has been significant in allowing those working in agriculture to continue to work their lands and maintain their

sources of income.

However, there remains an element of inequity, including the regional disparities (some municipalities are pumping water that should be shared regionally) and the overpumping of groundwater. “What is happening is that the municipalities that get funding for solar water pumping are tapping into a finite reserve and are basically running it as much as they can; it is very difficult for us to limit that because essentially they are going to run it for as much as the weather allows them to run it...They'd rather have the tanks overflow than stop running it.”

In the case of one municipality, they have a huge water tank that was supposed to service a much larger area but is now only servicing them. because of Lebanon's historic energy crisis and the high price of diesel, there was a slightly more sustainable extraction of water in the first years of the economic crisis from these reserves, and the aquifer would be healthy in terms of its supply. But with the solar water pumping, the pumping can take place as long as the sun is shining so the authorities would pump as much as possible, regardless of the aquifer's regeneration rate.

Restoration

Does the solar rollout aim to remedy prior and present harms faced by communities negatively impacted by the energy system?

Largely no. As a baseline, no one within the borders of the Lebanon administration has been spared the negative impact of the energy system. Most of the population has been harmed by the lack of access to energy and the prolonged power outages. In addition, people suffered from the harms of air pollution from the electricity production, include by private diesel generators, the dark streets at night as a result of power cuts, and the general instability that comes with energy shortages. In this sense, the solar rollout started to provide some remedies to these harms.

People connected to solar energy projects - be it on an individual or municipal level - have felt more comfortable. For example, people who were afraid to walk in the dark felt more at ease due to the solar-powered streetlights. Residents who benefited from solar projects saved money that would normally go to pay the diesel generator bills. Some rural municipalities were able to install larger solar projects and move away from generators, which decreased related pollution. All the interviews with the municipalities validated how beneficial this solar rollout has been for the residents. In many cases, solar has allowed many businesses to continue operating due to solar, helping them offset the economic losses caused by the electricity cuts.

Unfortunately, as reiterated countless times, the solar rollout has not been beneficial to the majority of the country's

49 Connor Kalso, “The Scramble for Solar: Safety & Environmental Concerns Loom over Renewable Energy”.

50 Rouba Bou Khzam, “Lebanon's Solar Revolution”.

51 Thomas Schellen, “The Race to Solar.”

52 Jamie Prentis, “Lebanon's Electricity Crisis Exacerbates Water Scarcity Problem”, The National News, 1 May 2023, available at <https://www.thenationalnews.com/mena/2023/04/30/lebanons-electricity-crisis-exacerbates-water-scarcity-problem/>

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residents, especially those in urban areas. In other words, the solar energy rollout had a semblance of restoration but still has a very long way to go to fully repair the damage on a sustainable, systematic, and national level, especially restoration for the marginalized communities across Lebanon.

Some Case Studies to Learn From

In the face of numerous structural injustices, there are cases throughout Lebanon that present some form of just energy use, access, or process. This section describes some of those cases that emerged during the research process. These cases can serve as examples for thinking about larger-scale, sustainable renewable energy solutions that could eventually be part of a national energy transition that is truly just. To reiterate, the solar rollout was catalyzed by the policy of desperation due to the economic and energy crises and the dire conditions they created. The following case studies are models that were able to meet people's needs, but are not in and of themselves an absolute solution. There have been numerous initiatives for solar projects throughout the country, like the Jabouleh Eco-Village or the Qabreekha's Solar Energy Project, but mapping them all is beyond the scope of this report. The cases mentioned here have been selected because of their consideration of 1- long-term planning, 2- the marginalized groups in their respective communities (in these cases mostly the Lebanese poor), or 3- a participatory process in their design.

An Australian Expat, the Church, the Tripoli's Youth⁵³

In a TV coverage of this solar project, one resident described this project as a "worry that is removed off of you" - "هم وانشال عنك".⁵⁴ This resident also went to express his frustration with the country's political representatives, saying that if all of the 128 members of parliament did their small part and donated some money for solar panels, the entire country would be lit up.

Youth volunteers in Tripoli wanted to support their community, especially during the COVID-19 pandemic and economic crisis. Electricity and residents' reliance on diesel

generators was a major concern, especially as the economic crisis made it harder for them to pay their bills. Solar power was a great way to meet the residents' electricity needs.

An Australian-Lebanese, who preferred to remain anonymous, donated money to install a solar project in a parking lot in Tripoli. The land belongs to the Motraniyeh Room Orthodox Church, and they offered it for this project because it has an element of community welfare. Around 130 to 150 vulnerable households benefited from this project with 5 amperes. Some residents continued to rely on the national energy grid and generators, while others stopped using diesel generators altogether. Regardless, this project reduced their energy costs and placated their worries.

This case shows the different elements that can come together to create a sustainable energy solution that puts the needs of the community at the forefront: led by the community members who identified their community needs, funded by a member of the Lebanese diaspora, and supported by a religious institution that lends its land for the benefits of the people.

Of course, as with any project, there were some special considerations for this location. First, the installation is close to the sea, so the metal structure needs to be rust- and wind-resistant. Second, because it was going to serve a relatively large number of people, the panels had to be of a more expensive type to produce more energy than the average panels commonly sold. The cost was higher, but the Australian-Lebanese donor was willing to pay the extra price.

A Mayor Takes the Initiative to Light Up the Town

This case study is based on an interview in the fall of 2023 with the mayor of Bechmezzine, Fawzi Kalash, who has made solar energy a top priority for his town since 2013. He has been part of a slow but steady effort to bring solar to the town, relying on a combination of financial and human resources, including international donors, local donors, the diaspora, and local civil society.

The town today enjoys a wide range of solar-powered services, including street lighting across towns and a solar water pumping station, the latter of which serves approximately 1,000 residents on a paid basis. Funding for some of the solar projects is complemented by funding from the diaspora and international organizations. For example, Bechmezzine's solar street lighting was made possible thanks to funding from two international donor organizations and their batteries are supported by donations from the diaspora, with which the town has open channels of communication. When the municipality has a new project, the municipal

53 "A solar energy station in the city of Tripoli covers the electricity needs for 1,000 houses", Al-Jazeera, 14 June 2023, available at <https://www.aljazeera.com/news/2023/6/14/>

54 "Goodbye to Generators and Hello to solar Energy", Hamsat Lubnaniya, available at <https://www.youtube.com/watch?v=DzHzvXDDgQk>

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members hold phone calls with the diaspora to explain the project and what the diaspora's role can be. The municipality is also one of many that also consistently shares its updates and projects on social media to keep its network informed of what it is doing.

Solar energy planning in towns like this is more feasible than in a city, for example, due to the size of its population (around 2,500 at most). Outside the municipal initiatives, the mayor said that about half of the town has installed some form of solar PV technology. He added that this figure is based on observations from informal counting by the local police, as there is no actual data on how many people have installed solar panels and with how much storage capacity. Another element to learn from in the Bechmezzine case is the role of the youth groups in their area, who have elected representatives to monitor the municipal work, including its solar energy projects. This is an important entity to have in order to ensure transparency in municipal work, in addition to maintaining a continuity in political participation regardless of who is elected within the public institutions themselves.

When asked if he thought Bechmezzine could be energy sovereign, he replied, "100%. This is what we are aiming for. We have provided energy for water - we are self-sufficient in water and lighting in the village. We are now moving into the households. If we can capture all the energy that is wasted during the day, it would provide for more. All it takes is planning." The municipality's goal is to provide 15 amps of solar energy for each household; there are around 400 homes. "Maintenance is a burden for us, and this is an issue for us with the donors: they offer a project, but the maintenance costs are on us. This is the right way to do it, but we do not have capacity as municipalities." The 15-ampere project per household was a plan before the solar boom - now that the costs are lower, the municipality is renewing the funding applications and financial drives.

In this case, the factors that supported a just rollout include leadership with long-term planning that brought additional capacity in the village in a strong but steady way; complementary innovative funding streams between international donor organizations and the diaspora; local youth groups that monitor the work of the municipality; and regular communication with Bechmezzine residents.

Environment Academy's Baalechmay Team

This case looks at the solar water pumping project in Baalechmay, which is the result of a three-year collaboration with the Environment Academy (EA). The EA is a program housed at the American University of Beirut's Nature Conservation Center. The EA is a "community-born and expert-supported movement that aims to empower hard-hit

local communities to become agents of transformation and stewards of their own just, healthy, and sustainable future".⁵⁵

The EA process starts with a public call for community change-makers to apply for the program. The initial short-listed applicants take part in training sessions to learn how to submit a good application. As EA's co-founder Sammy Kaye said, "We don't just want people who are really good at writing proposals to join, but we want people who are very frustrated with local public services and environmental breakdown." After they apply, they are judged based on the urgency of the case and the ability to think systematically about a solution. Here, the EA involved MTV, one of Lebanon's traditional media platforms, to announce the groups selected. MTV's role helped diversify funding streams (crowdfunding was a part of getting this three-year project off the ground) and created some accountability mechanisms for the local authorities in a context where accountability is rare; they say they will do something on public television which spotlights and pressures them to fulfill their commitments. It also reaches more people and brings a lot of attention to the issues. The EA then selects 10 communities. Baalechmay was one of them and focused on improving community access to safe water.

The process continued with the EA team going to Baalechmay with the community teams and telling them to take them wherever they want to help explain the context, the places they love, or the community's needs. At this stage, the community teams have begun to receive technical mentorship and exchanged with their expert mentor in a solution co-creation process. Again, the whole project starts with the community, and not just because the AUB team was committed to certain target areas or KPIs. The initial work with the municipality consisted of simply informing them, while the community team led the work. Later the municipality became more involved, and the co-creation of the solution included the more sensitive socio-political dimension of their local water issues. They ended up working together to design the details of a solar water pumping system for the village. After a two-year process of securing grants, the system was successfully funded by the Japanese Embassy and recently constructed. The solar-powered water pumping system will serve over 5,000 people. They are currently in the process of installing a metering system that can be monitored by the community team to better ensure that the collective project has collective benefits.

The decision on this project did not happen overnight. It was the product of a year and a half of work, research, networking, and ensuring the community priorities and participation. The EA team is still working with the community as they enter their third year of collaboration. In short, the factors that proved successful for the project in Baalechmay due to the model

⁵⁵ Environment Academy, available at <https://www.environment-academy.org/>

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that the EA was trying to promote include: 1- The design of the water pumping project was community-led (they decided on the town's priorities and knowledge to consider), 2- The deep trust built with the technical mentor and the wider EA team, 3- The unpressured participatory process built into the design of EA, 4- The specificity and clarity of the project (the community knew exactly what it wanted and what the broader issues were), which made it easier to apply for grants, 5- the media support in getting attention and engagement in the project, 6- The community's concerns and intentions were validated by the support of a reputable institution. This case is yet another reminder that a solid foundation for effective projects requires time, flexibility, collective effort, and persistence. But unless these are part of a larger regional strategy to secure access to safe water, regional injustices remain.

There are numerous examples across Lebanon of successful energy provision at the local level, of which the above examples are a simple illustration. These case studies are exceptions and not the rule for the solar energy rollout in Lebanon. There are many elements that need to be taken into account for successful local energy provision, but this cannot replace the role of national energy provision.

Recommendations

Energy is central to human rights; it is the foundation of just about every facet of life, including adequate housing, water, and education.⁵⁶ Unfortunately, with the exception of small and isolated initiatives by local communities, the direction of the solar energy transition in Lebanon suggests that energy access – regardless of its source – may continue to be a commodity for those with financial means, rather than a right to be enjoyed by all. Strong national energy production that is accessible to all residents is the surest way to the right to energy. Decentralized efforts, while laudable, have limitations and risk perpetuating regional inequality.

The following recommendations aim to outline some ways in which stakeholders – including donors, civil society organizations, and public institutions – can think about a more just solar energy rollout based on equity, accessibility, and long-term sustainability for all of Lebanon's residents.

To public authorities, including municipalities

Partake in true participatory processes in project and policy planning

No project should be planned and implemented without the

input of those who will be affected. Stakeholders across the solar rollout must ensure a truly participatory process, which can take many forms. Stakeholders involved in solar energy projects should consider how their work may contribute to energy injustice and imbalance between the regions they serve, while trying to mitigate it as much as possible.

One way to do this is to include more consistent town hall discussions where residents can learn about their rights or how new laws impact them (such as the Decentralized Renewable Energy Law) will affect them. Another is to ensure transparency across projects. The right to information needs to be enforced across the board, and residents across the country should have answers to questions about solar energy, including how much energy is being produced, how projects are being implemented, who is benefiting, how much money is being spent, and how.

As Sammy Kayed described the successful participatory nature of the EA: “Our focus is on tenacity, to keep trying to be collective, to keep trying to find new ways to bring groups in from the outside...I don't think there is a master strategy you can have and then go in and do it.”

Take the initiative to coordinate with other regional entities working on solar projects in Lebanon

Since so much of the energy injustice occurs across regions, stakeholders involved in the solar energy rollout may want to consider working or coordinating with neighboring regions to work on somewhat larger-scale initiatives (e.g. a municipality with a union of municipalities).

To the private sector

Include and enforce a waste management strategy at the outset of the solar implementation one

It is the responsibility of those who distribute solar technologies to ensure that it is disposed of properly. As outlined above, the forthcoming waste of solar technology will create a serious crisis on top of the existing waste situation.⁵⁷ It is a must, therefore, to prioritize proper waste management to address this. The Ministry of Environment organized a discussion on this issue earlier this year, so it is clearly on the agenda of public authorities.⁵⁸ Unfortunately, waste management in Lebanon is still very backward,

57 Jacob Boswall, “Lebanon: the State of Waste”, Heinrich Boll Stiftung Beirut, December 2019, available at https://lb.boell.org/sites/default/files/2019-12/Lebanon_the_state_of_waste_1.pdf

58 On March 28, 2024, the Minister of Environment shared an update of a working group with stakeholders in Lebanon on managing waste from all types of renewable technologies, available at <https://www.linkedin.com/feed/update/urn:li:activity:7179353887798136832/>

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and entities that want to be part of the coordinated waste management should learn about past mistakes and their present manifestation so as not to repeat them.

Support innovative financial mechanisms or incentives for local, municipal, and community projects

Finding a way to bring back interest-free loans, whether from the government or donors, private companies, banks, or the Central Bank. Finding creative mechanisms to finance solar energy projects over the long term is another one. As the case studies above show, the successful local models were a result of different actors coming together. As one mayor said, it is important to think more collectively. "We have to stop with individual benefits and get out of the mentality of 'you scratch my back and I scratch yours'. National and collective benefits are more important than personal benefits. So far, we haven't gotten there, and until we get out of this mindset, it's going to remain chaotic."

The 2019 financial crisis, coupled with the impact of COVID-19, halted funding mechanisms, including the central bank loans and private funding.⁵⁹ Thus, the financial crisis added an obstacle to financial incentives for solar energy: the instability of the Lebanese lira discouraged banks from continuing or increasing their loans, as clients would have the right to repay the loan in Lebanese lira, a potential financial loss for the lender.⁶⁰ However, the subsidized loans that existed in the past have actually led to an increase in installations. Investment in solar PV increased from \$2.29 million in 2010 to \$125.83 million in 2019.⁶¹

To civil society organizations

Tapping into diaspora energy and expertise

In the case studies included in this paper, the Lebanese diaspora has been a significant actor in mobilizing finance and know-how for solar energy projects. Having a consistent channel, be it of funding or reference for expertise to support the solar infrastructure could be an effective initiative. Their support is not limited by the same conditionality that

59 Thomas Schellen, "Global Obligations, big goals and missing parts", Executive Magazine, 12 Nov. 2021, available at <https://www.executive-magazine.com/special-report/global-obligations-big-goals-and-missing-parts>

60 Marianne Gros, "Will Lebanon's energy recovery become a casualty of the war?", 26 Oct. 2023. Euromoney, available at <https://www.euromoney.com/article/2cdcnpvc9yumknu8gtreo/esg/will-lebanons-energy-recovery-become-a-casualty-of-war>

61 Melda Jabbour. "2019 Solar PV Status for Lebanon", LCEC, March 2021, available at <https://lcec.org.lb/sites/default/files/2021-04/LCEC1.pdf>

international organizations have, so it can be more flexible and adaptive to the local context.

Accountability and monitoring of the private and public sectors involved in the solar rollout

Monitoring of solar infrastructure is but one pillar of a more equitable and just solar energy rollout. The rapid transition to solar has been accompanied by a number of issues documented across Lebanon, including haphazard installation, lack of maintenance, and the absence of accountability for faulty products. Holding the private sector accountable for consumer protection is a must. Another way forward is to strengthen the monitoring of the quality of technology entering the country; this is already done at entry points but there are more informal channels through which faulty products can enter. The 2021 report from Lebanon's Industrial Research Institute found that some solar PV technology is being sold to the Middle East and African markets instead of being sent for recycling, which also increases the potential for malfunctioning products to be sold.⁶²

One option is to use existing bodies to hold stakeholders accountable, such as strengthening the role of local governance, watchdog or transparency organizations. Ideally, such groups would function and monitor regardless of who is in charge and elected in the public institutions.

Setting up citizen assemblies to engage in the just process of solar PV installation

One practice that would help with collective, equitable solar projects in Lebanon is to make citizen assemblies more common. Engaging with citizen assembly models on a larger scale could be a useful structure for a more equitable energy transition, as it brings in more perspectives and considerations for policymakers to consider. Citizen assemblies challenge the top-down approach while reinforcing the idea that energy structures are more than just physical and technical, but also a set of political relationships.⁶³

This video is a helpful explainer of what a citizen assembly is. And this [one](#) gives a brief of what the citizen assembly in Hamra looked like, with some assembly members describing their experience with this assembly.

To borrow from Zeina Abla's words, "Without engaging all stakeholders in decision-making and ensuring that their

62 Ilias Tsagas, "Lebanon Discourages Used PV Panel Imports", PV Magazine, 1 Nov. 2021, available at <https://www.pv-magazine.com/2021/11/01/lebanon-discourages-used-pv-panel-imports/>

63 Ala'a Shehabi, "Energy Poverty and the Necessity of Innovation: Communal Renewable Energy in Times of Crisis", Alternative Policy Solutions, 1 Jan 2023, available at <https://aps.aucegypt.edu/en/articles/958/energy-poverty-and-the-necessity-of-innovation-communal-renewable-energy-in-times-of-crisis>

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participation is reflected in decisions, as well as considering the drawbacks and benefits of transitioning to renewable sources, the energy transition could result in unjust outcomes, regardless of its environmental imperatives.”⁶⁴

Raising residents' awareness about sound solar practices, including energy-efficient technologies and behaviors

This recommendation was particularly emphasized by two of the mayors interviewed for this paper, who commented on how the lack of awareness impacts a more effective solar rollout, including the quality of installation, the benefits and harms of solar energy installation, or the residents' rights to their rooftops. Donor agencies have produced guidebooks to assist users who want to install solar energy. Donors such as the UNDP have produced a consumer guide with questions about buying solar (e.g., what to buy and why)⁶⁵ and a slightly more detailed guide, co-funded with the EU, on choosing your solar system with battery storage.⁶⁶ Producing a guide to the do's and don'ts for a just solar rollout based on each geographical area could also be part of this awareness-raising. Here questions of equity and justice would be at the forefront for stakeholders leading the solar rollout. Awareness could also be raised about the regulatory and legislative framework, including the Decentralized Renewable Energy Law and the pros and cons of connecting to the grid at a later stage. There is naturally a distrust in Lebanon's public institutions, so this is not an easy task.

On a more technical level, which requires awareness, several factors have impacted the absolute benefits of solar in Lebanon. There is also the need for newer technologies that are less energy intensive; many in Lebanon inherited old, energy-consuming technologies which is not the most effective when relying on solar.

To donors

Forums for knowledge exchange on solar energy in Lebanon

Supporting or organizing consistent knowledge forums that can act as an exchange of knowledge between communities,

grassroots initiatives, civil society organizations, and educational institutions on relation to all types of developments related to solar energy would be useful in the rollout. This type of open dialogue and exchange could create connections and networks that bring about greater cooperation and coordination across the country. It would also introduce learning practices of equitable solar energy rollout.

Support with holistic thinking for climate project

One of the many misfortunes of the solar rollout in its current state is that it is spatially constrained, be it on the rooftops, parking lots, vacant lots, etc. The climate crisis demands a radical rethinking of land use and management, and with solar, for example, there is simply not enough space for this individualized and haphazard rollout. For example, at one point, green roofs were trendy for civil society organizations to invest in because they reduce urban heat. Now there is a competition for Lebanon's urban rooftops. Solutions for the climate crisis require thinking in systems.

64 Zeina Abla, "Power Dynamics for a Just Transition. The Macro and Micro in Lebanon", Arab Reform Initiative, Dec. 2023, available at <https://s3.eu-central-1.amazonaws.com/storage.arab-reform.net/ari/2023/12/19233627/2023-12-19-ENG-EPP.C.P-V13-WEBSITE.pdf>

65 UNDP; Konrad Adenauer Stiftung, "Solar Energy: What to Buy and Why?" Executive Magazine, available at https://www.executive-magazine.com/wp-content/uploads/2021/11/EX260-1_sept-oct-21.pdf (page 18)

66 CEDRO-UNDP, "Solar Photovoltaic Systems for Residential Homeowners: A Guide to Selecting your Solar System with Battery Storage", available at <https://www.cedro-undp.org/Library/Assets/Gallery/MediaImages/CEDRO%20PV%20for%20residential%20Homeowners.pdf>

ANNEXES

Annex I: List of Interviewees

1. Lebanese Renewable Energy Foundation
2. Ebla Initiative
3. Institute for Global Prosperity at UCL
4. Sour Municipality
5. Tripoli Municipality
6. Bechmezzine Municipality
7. Beit Mery Municipality
8. Mar Chaaya Municipality
9. PhD Candidate on pastoral governance
10. Nature Conservation Center/Independent Research
11. Lebanon Solar Energy Society
12. Arc En Ciel
13. Diaries of the Ocean

Annex II: Questionnaire Guiding Discussion with Municipalities

Introduction and General Municipal Solar Overview

- Could you kindly introduce yourself and provide insights into your role within the municipality?
- Considering the evolution of solar energy adoption in the country, what prevailing trends, opportunities, and challenges have emerged from this transition since the 1980s? (Please elaborate if relevant; the 1980s marked the nascent stage of solar energy adoption in Lebanon)
- Which communities have successfully embraced solar energy and capitalized on its benefits?

Municipal Deployment of Solar Energy:

- What sources of energy currently constitute your energy mix? Could you furnish a breakdown of the various energy sources? Additionally, could you highlight your municipality's total energy demand?
- At what point did your municipality decide to integrate solar panels into its energy infrastructure?
- How many solar projects have been undertaken thus far, their respective locations, and the corresponding energy generation capacities?
- Could you elaborate on the criteria that guided your selection of the solar energy installation company?
- Could you describe the procedural aspects of the process?
- Could you provide insights into the financial investment associated with these solar projects?

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- Are you familiar with the maintenance requirements of the solar panels? How frequently do you carry out maintenance activities?
- To what extent do you find the information provided by the installation company reliable and comprehensive?
- Have any challenges arisen since the implementation of the new solar setup? If yes, could you elaborate on these challenges and your approach to addressing them?
- Does the current solar energy setup align with your municipality's energy needs and meet the initial expectations? Could you provide an overview of your approach to solar energy storage, if applicable?
- How do you manage the disposal of solar panels once they reach the end of their lifecycle?
- Could you highlight any notable private initiatives related to renewable energy within your municipality?
- How do you collaborate with neighboring municipalities or the council of municipalities on renewable energy initiatives?

Financial Aspects:

- What prompted your municipality to prioritize energy initiatives within your funding schemes? Could you elaborate on the motivations behind this decision?
- Could you give some details on the type of financing you received for solar energy projects (such as loans, grants, etc.)?
- What mechanisms are in place to oversee and ensure the accountability of the companies engaged in solar panel installations?

Final Question:

- In your opinion, what policy reforms or enhancements are required to facilitate broader and more equitable adoption of solar energy, and potentially other renewable energy sources? How can these lessons be applied to encourage sustainable energy practices on a larger scale?

About the Arab Reform Initiative

The Arab Reform Initiative is an independent Arab think tank working with expert partners in the Middle East and North Africa and beyond to articulate a home-grown agenda for democratic change and social justice. It conducts research and policy analysis and provides a platform for inspirational voices based on the principles of diversity, impartiality, and gender equality.



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