



## Community owned Solar energy projects as a catalyst for local governance: The case of Al-Gezira state

مشاريع الطاقة الشمسية المملوكة للمجتمع كداعم للحكم المحلي: دراسة حالة ولاية الجزيرة

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باحث مهتم بالاقتصاد السياسي والحوكمة والتاريخ. يركز عملي على دراسة المؤسسات ودورها في تشكيل العلاقة بين المجتمع والسياسة والاقتصاد. أسعى لتقديم تحليلات تسهم في فهم التحديات التنموية والمجتمعية الراهنة.

## About the Author:

A researcher interested in political economy, governance, and history. My work focuses on the study of institutions and their role in shaping the relationship between society, politics, and economics. I aim to provide analyses that contribute to understanding current developmental and societal challenges.

## ملخص تنفيذي

أدى الصراع المدمر في السودان إلى انهيار شبه كامل لمؤسسات الدولة، مما عطل وصول الخدمات الأساسية إلى الملايين. في هذا السياق، ظهرت مشاريع الطاقة الشمسية المملوكة للمجتمع كحل عاجل وفَعّال لمعالجة نقص الكهرباء والمياه الناتج عن أزمة الحرب وغياب الدولة. تجادل هذه الورقة مستندة إلى دراسة حالات واقعية في ولاية الجزيرة، بأن هذه المشاريع لا تقدم مجرد خدمات، بل تعمل كعامل تمهيدى أو حفاز لتقوية الحكم المحلي، حيث تزيد من قدرات المجتمعات المحلية في مجالات القيادة، والتمكين الذاتي، وتقوية حس الملكية. تؤكد الدراسة، التي استخدمت منهجية نوعية ومقابلات مع خبراء وفاعلين محليين، أن هذه المشاريع نجحت بالفعل في تعزيز قدرات حوكمة مجتمعية. ومع ذلك، تشير النتائج إلى أن هذه المكاسب تبقى غير مأموسة وهشة للغاية، وقد تخاطر بتعزيز نفوذ النخب التقليدية دون شمول بعض الفئات المهمشة بشكل فعال. ويخلص البحث إلى أن هذه المبادرات تخلق "فرصة حوكمة عابرة" وليست هيكلًا مستقرًا. لمنع تلاشي هذه القدرات الهشة، توصي الورقة بشدة بضرورة أن يتحول تركيز المانحين والمنظمات غير الحكومية والجهات الفاعلة المحلية من مجرد الدعم الفني لتقديم الخدمات إلى الاستثمار في إضفاء الطابع الرسمي والمؤسسي على مكاسب الحوكمة هذه. ويجب أن يشمل ذلك وضع معايير مناسبة لبناء القدرات، وإنشاء شبكات مجتمعية، والاعتراف الرسمي بوحدات الحوكمة الشعبية الناشئة. هذا الإجراء ضروري لضمان أن تؤدي المشاريع المماثلة إلى تمكين حوكمة مجتمعية مستدامة وتنشيط المشاركة المدنية في التنمية والسياسة.



## **Executive Summary**

The devastating conflict in Sudan has led to a near total collapse of state institutions, leaving millions without access to essential public goods. In this vacuum, community owned solar energy projects have emerged as a convenient solution to electricity and water shortages in response to the governance crisis. This paper argues that these projects, exemplified by insights from real-life cases in Al-Gezira state, are acting as a catalyst for local governance through increasing communities' local governance capacities in leadership, empowerment, and ownership. The paper uses a qualitative methodology including interviews with expert intermediaries and local community actors. The analysis follows three core elements of the Auckland City Council community governance framework (ACC) to analyze the insights and evaluate how the solar energy projects impact these specific local governance capacities. The Analysis confirms that these projects are successfully building local community governance capacity. However, it finds that these gains are informal, highly vulnerable, and often risk reinforcing the political roles of traditional elites and are not inclusive to marginalized groups like women. The key finding of the paper is that these projects create a "governance moment" not a stable structure. To prevent these informal capacities from disintegrating, the paper strongly recommends that Donors, NGOs, social enterprises and local actors should move beyond a narrow technical focus on services delivery to invest in the formalization and institutionalization of these projects' governance gains. This includes standardizing training, creating community networks, and officially recognizing these grassroots governance units to ensure that similar community projects can empower sustainable community governance and activate civil participation in development and politics.

## **Introduction**

Sudan has always been characterized by weak government capacity to deliver public goods. However, this situation deteriorated significantly after the outbreak of war in 2023, as the state faced a deep shake to the core. Critical services like water and electricity have reached the level of non-existence in some conflict-affected areas. Local communities are now forced to create their own solutions to survive. A proven alternative has been the use of solar energy to provide essential electricity for water pumping and other essential energy.

Even before the war, the usage of solar energy had rapidly increased as a reaction to weak electricity access and the rapid decrease in the prices of solar energy. However, this saw a rapid increase following the war as shown by the fact that almost all the water pumping facilities in the northern and central parts of Al-Gezira are now running on solar energy. Traditionally, the service gap left by the government has been filled by civil society, international aid organizations, and community initiatives. However, with the gap widening due to government weakness and the shrinking of global aid budgets, the reliance on community initiatives has increased rapidly. These local initiatives enable the communities to provide essential funding, allocate and manage resources to directly address community priorities, which combined act as a local governance characteristic [1].

While much of the existing research has focused on the developmental and humanitarian aspects of community solar projects, these initiatives also arguably have a positive impact on the local community's governance capacity, such as collaboration, organization, leadership, and sense of ownership. Recognizing the likely increase in these projects and the continued weakness of government capacity in the foreseeable future, it is essential to understand how they affect local communities' governance abilities. This understanding is key to developing policy recommendations that can enhance and sustain their positive impact.

To provide a structured evaluation of this emergent community governance, this paper adopts a local governance model developed by the city council of Auckland in New Zealand which is used originally to provide a framework for how the Council works with communities in local decision-making and service delivery. The model



emphasizes inclusiveness, local leadership, and acting on shared values to strengthen community wellbeing. Three core elements from the ACC Community Governance Model were chosen to be used as a framework for the analysis: Leadership, Empowerment, and Ownership. While the complete ACC framework is tailored to a different context, these three elements are chosen because they represent building blocks necessary for any grassroots collective action to develop into sustainable governance. In the fragile context of Gezira, which lacks formal structures, this structured lens allows the analysis to categorize and evaluate the most critical capacities being built at the community level.

This paper will explore the reality of community owned solar projects in Al-Gezira state and their impact on local governance through insights of 6 interviews conducted with experts from intermediary organizations and local community actors. For the purposes of this paper we define local governance as a situation where whatever a governance actor (an international NGO, a central government institution, a local government agency, a private sector enterprise or a community structure) does, is planned, implemented, maintained, evaluated, and controlled with the needs, priorities, interests, participation, and well-being of the local population as the central and guiding consideration[1]. Gezira state is a unique case as it is a conflict affected state that was enjoying relatively strong state governance but fell under the disruptive control of the Rapid Support Forces (RSF) for a year, and since then returned to state control with a weakened infrastructure and damaged local governance structures. The goal here is to provide practical recommendations for the stakeholders, strengthening not just service delivery, but the very foundation of local community governance and thus civic empowerment and participation.

### **The current paradigm:**

The existing literature on community engagement in renewable energy projects in fragile in conflict-affected states, such as Sudan. The research often focuses on two domains: a technical and developmental focus on clean energy access and humanitarian aid, and a more theoretical discourse on development governance in fragile settings. This paper works on the intersection of these domains by

examining how community owned solar projects can serve as a catalyst for community governance.

A critical starting point is the concept of “community energy”. As defined by Rogers et al. [2], community energy refers to ‘installation of one or more renewable energy technologies in or close to a community with input from members of that community.’ A key characteristic is that the community directly benefits from using renewable energy and conserving natural resources. In this regard, communities require institutional support to actively engage in project leadership roles. Ambole et al. [3] further argue that energy communities are focused on shifting the benefits and governing powers to local communities, ensuring that community energy initiatives are managed collectively by consumers to improve their degree of ownership, participation, and energy security. This perspective is crucial as it moves beyond viewing energy as only a developmental tool and positions it as a driver of community empowerment. Research from organizations like the OECD highlight the authority left by weakened central governments, which is often filled by informal, localized governance structures [4]. Community governance, defined as “community level management and decision making “by Totikidis et al. [5], emerges as a key concept, distinct from corporate or public governance due to its focus on community energy project become particularly relevant, as they can provide electricity to essential services and support livelihoods in areas with degraded state infrastructure while simultaneously strengthening community governance capacities[6] .

However, the implementation of renewable energy projects is not without risks. As a SIPRI commentary highlights, poorly managed projects can exacerbate existing conflicts, particularly over land use or resource management [7]. This underscores the importance of supporting and enhancing such projects, especially in the good governance side. To navigate these complexities, Hargreaves et al. [8] introduce the role of “community energy intermediaries,” non-governmental organizations or enterprises that provide crucial support in networking communities, offering professional services, funding and interfacing with policymakers. These intermediaries are vital for transforming community energy from a mere technical solution into a viable mechanism for bottom up, sustainable governance in a fragile state like Sudan. However, a key limitation is that, just as the existing research and

concept, most policy suggestions are based on studies from developed countries. This leaves a significant gap in local data and analysis from a context like Sudan, which this paper aims to address.

### **Community Solar projects models in Sudan:**

Generally, there are different Models for establishing community solar projects. In some cases, Intermediaries such as NGOs or social enterprises play a key role. These organizations secure funding from aid or charity funds, then directly select and implement projects in specific communities. Once the project is complete, the ownership is transferred to the local communities.

In another model, these organizations act as paid expert companies, providing technical and managerial services and consultations while the community itself secures the funding and ownership of the solar project. However, the most common approach is a fully localized one where villagers use their own resources to fund, implement, and manage the projects entirely on their own.

### **The case of Al-Gezira state:**

The Gezira case study, drawn from both expert and local community interviews, provides a compelling narrative of how informal governance structures are emerging and the challenges they face. The findings are organized using the core components of the Auckland City Council Community Governance Model: Leadership, Empowerment, and Ownership.

#### **I Leadership:**

The process of forming leadership within the solar projects shows on a small scale how a society can rebuild itself. The expert intermediaries' interviews highlighted a trust-based approach. The organization does not appoint leaders; it facilitates their emergence by requesting the community to nominate people to coordinate with and later hand over the project. These people are normally selected from the most active people and the traditional local leaders. The approach is a hybrid one, drawing from both competence (the most active individuals) and traditional



legitimacy (local elders). While this approach ensures community buy-in and minimizes conflict, it is crucial to recognize that the process does not necessarily change existing local power dynamics. The solar project may legitimize and reinforce the authority of existing elites who already possess the social capital to mobilize resources or mediate with external intermediaries. Thus, the selection process reflects power negotiation, balancing the need for efficient project management with the necessity of respecting deeply rooted social hierarchies. This approach is a pragmatic recognition that legitimacy in this context is not only granted by a distant authority but earned through demonstrated action and trust. Thus, in the case of intermediaries involved, there is an emphasis on letting the community decide the project leadership roles for itself, which is also the case in the local communities that didn't need intermediaries like Al-Nuba village:

A community member from Al-Nuba village, which saw its previous solar project stolen, provided a powerful example of this process:

"We have a small committee of about five people. They are the ones who were most active in getting the project started after the last one was stolen. Three of them are teachers, one is an active student, and another is a respected elder. We chose them because they are trustworthy and good at getting things done. It wasn't a big meeting, more like a few of us agreed on who should lead, and the community didn't object."

This insight shows that leaders are not chosen based on a formal election but on a collective, informal assessment of their competence and integrity. Their authority is derived from their ability to lead the delivery of a tangible, lifesaving service. The committee's legitimacy is tied directly to the project's functionality and its members' ability to manage it transparently, which stands in stark contrast to the distant and corrupt state institutions they have known in previous service projects delivered by the local government.

Awad, a resident of Sharafat village shares a similar story. He recalls how government inconsistency and corruption meant the old water pump often lacked fuel. Villagers felt trapped, believing the government should provide the fuel, and were discouraged from finding a permanent solution. He notes that villagers





weren't aware of a solar alternative until the pre-war fuel crisis became so severe that they were forced to act by gathering money to implement a solar station to power the water pump, which was stolen by the RSF a few months after they occupied the area. He added that because the community was already confident in solar as a solution, and confident in the small service committee that made the first initiative, reestablishing the project took only a few weeks after the RSF left.

In his work with a Takaful organization, an expert observed a remarkable lack of conflict in the communities implementing solar projects. He attributed this to a strong sense of shared vision and a clear understanding of community needs. This collective responsibility and initiative not only built leadership capacity but also strengthened social bonds.

Community Solar projects help communities taking responsibility and showing initiative, along with forming a shared vision and understanding. These aspects help to build leadership capacity at all levels and strengthen social capital within the communities.

## **II Empowerment:**

The solar projects serve as an enabler for the community as various members find a chance to participate in many decision-making activities and participate in the project while also enjoying the direct positive results of the project.

A community member from AL-Housh village pointed out this empowerment: "It has given us a reason to come together. Before, everyone just looked after their own family. Now, we have a dedicated WhatsApp group including most of the village citizens where we discuss multiple services and charity works, and we know we must work together to fix the pump or gather the money. It has taught us that we can solve our own problems if we organize ourselves."

This shift from individual survival to collective problem-solving is a foundational act of civic empowerment. Working together on a solar project with a clear goal and shared outcome not only increases local social capital but also connects it to economic capital through local funding.



Interviews with experts from a social enterprise and a solar company revealed that while there's no formal capacity building training, significant informal capacity is built through on-the-job management. Intermediaries intentionally involve local communities in various stages of the project, from deciding the project's location and resolving land-use conflicts to providing labor and, later, managing maintenance and security.

While the solar projects undoubtedly increase community participation across various groups, it is important to assess whether this translates into genuine empowerment for marginalized groups such as women and youth. The demands of service maintenance and management may be unevenly distributed along existing social and gender lines. For instance, while women may benefit directly from improved water access, their involvement often remains very limited in providing labor or logistical support or getting any technical training or expertise, this limited involvement is also the case in holding key decision-making roles within the project committees. This suggests that the projects may risk solidifying existing social hierarchies by formalizing the labor and political roles that groups traditionally occupy.

Currently, this empowerment is focused on the project itself and extends to minor collective actions like raising money for an ill person or resolving small conflicts. However, it may plant the seed for future collective action on other issues, though there is no direct evidence of such an impact yet. As one community member noted: while they haven't undertaken another major project, they "talk about it" and feel they have the "confidence" to do so. This suggests the project instills a shift from a mindset of helplessness to one of proactive agencies.

### **III Ownership:**

The sustainability of any community-led project depends on the concept of ownership, a principle that is both a practical necessity and a powerful driver of governance. The experts interviewed made it clear that while their projects may be externally funded, community contribution is an essential component of their model. This is not simply a transactional requirement but a core aspect of their strategy.



The nature of this contribution is intentionally flexible, fitting the economic realities of the communities it serves. It is shown as a small financial contribution, the provision of assistance such as labor for site preparation, or the handling of administrative tasks and securing local permits. This requirement serves as a key "indicator of sustainability" for the intermediary organizations. It is the primary factor in determining which communities are selected for a project, as it demonstrates their existing capacity for collective action and shared responsibility. As one expert stated, "When people are willing to sacrifice for the project, when they put their own money or their own labor into it, they won't let it fail. It becomes their project, not ours".

Ownership is not an abstract concept; it's something a community earns through shared sacrifice. For villagers like Al-Nuba and Sharafat, whose first solar project, one they had funded themselves, was stolen by the RSF, this idea of ownership is powerful. Their decision to fundraise and rebuild after that devastating loss is the ultimate proof that they are not just passive recipients of aid. The villagers who were the recipients of a United Nations Development Programme (UNDP) project in three villages east of Madani demonstrated their resilience and self-reliance. After initially receiving complete solar pumping projects from the UNDP, they took it upon themselves to rehabilitate and protect the damaged projects, even before the Rapid Support Forces (RSF) left their areas. This initiative shows the villagers' determination to secure their own future. Their actions represent a foundational element of sustainable governance, transforming communities from passive aid recipients into owners of their services.

### **Findings and Implications:**

The community solar projects in Al-Gezira are more than just a source of power; they demonstrate that even in the face of institutional collapse, local communities have the capacity and resilience to forge their own path. The local governance capacities developing from these projects—characterized by emergent hybrid leadership, collective empowerment, and a strong sense of ownership—offer a powerful catalyst for any sustainable local governance structures that will emerge. This process is most clearly seen in the trust-based selection of project leaders, the



increase in local social capital through shared action, and the community's willingness to fund and sustain its own assets.

However, the analysis of the Gezira case demonstrates that these governance gains are currently informal and highly fragile. The projects operate within the constraints of existing local power dynamics, meaning the selection of "new" leaders often relies on a pragmatic compromise between demonstrated competence and traditional social authority, which can reinforce existing hierarchies and potentially exclude marginalized voices like women. Furthermore, while community empowerment is clear in resource mobilization and collective action, these lack formal recognition, standardized procedures for financial management, and established mechanisms for leadership succession planning.

The central finding is that the community solar projects create a "governance moment," not an established structure. The local capacity built is vulnerable to disintegration or co-option without support. Therefore, the challenge now is for international and local actors to recognize these fragile gains and support them with an enhanced approach. By moving beyond a narrow focus on technical outputs and explicitly investing in the long-term sustainability and formalization of community governance, we can ensure that these solar projects become a bedrock for effective civil participation in development and politics. This foundational need for institutional support directly informs the subsequent recommendations.

## **Recommendations**

Based on the findings, community solar projects can help build a foundation for local governance. However, the ability to turn these informal capacities into sustainable structures and impactful initiatives is fragile and not yet proven. To make these efforts last, a new approach is needed by all stakeholders to support these gains and help formalize and institutionalize them into solid and sustainable local governance structures.

### **For Donors, Aid Organizations and social enterprises:**

- Invest in Intermediaries' Follow-up Capacity: Acknowledge and fund the critical role of organizations as "community energy intermediaries." Provide them



with the resources needed for sustained follow-up and capacity building for the communities beyond the project's initial lifecycle.

### **For Civil Society Organizations & Social Enterprises (Intermediaries):**

- **Formalize Informal Capacity Building:** Develop a structured curriculum for the informal training they are already providing. This could include modules on basic financial management, conflict resolution, and leadership succession planning.
- **Create a Network of Community Committees:** Facilitate the creation of a network for community leaders to share experiences, successes, and challenges. This would strengthen their collective voice and provide a mutual support system.
- **Document and Standardize Governance Models:** Work with communities to document their decision-making processes, roles, and responsibilities. This will provide a model for other communities and can be used to advocate for a supportive policy environment.
- **Technical Training for Marginalized Groups:** Ensure technical and leadership training is intentionally delivered to female and youth participants. This addresses the empowerment gap by encouraging that their involvement moves beyond "logistical support" into technical mastery and empowerment within the community.

### **For Local Governments:**

- **Recognize and Legitimize Community Governance Structures:** Instead of viewing these community committees as a threat to their authority, future governments should recognize them as legitimate, bottom-up governance units.
- **Create a Supportive Policy Environment:** Implement policies that facilitate community ownership, such as clear guidelines for licensing, asset registration, and shared management of public resources. This would ensure that the new governance structures can function legally and with official recognition.

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