



# The role of decentralized renewable energy in peacebuilding

by Isobel Edwards

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## About QUNO

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## WORKING DOCUMENT

**What peacebuilding tools are already at our disposal for reducing the likelihood of violent conflict related to energy extraction and natural resource stress related to climate change?**

**This publication explores the role of decentralized renewable energy as a peacebuilding tool, in global efforts for a net-zero carbon energy transition.**

**This remains a working document—comments are welcome and can be sent to [quno@quno.ch](mailto:quno@quno.ch).**

## Introduction

Energy systems have the capacity to generate conflict. This may be through the economic importance of the energy source, the physical and technical characteristics of the energy carriers, or the environmental consequences of the energy use. Fossil fuel projects have traditionally played a central role in providing energy to most countries around the world, and at the same time have played a part in exacerbating community tensions and, at times, even violent conflict.

Community tensions related to energy systems can arise through factors such as power struggles over resource-rich areas, energy blockades, energy dominance in political negotiations, internal conflicts, accidents and terrorism involving hydropower, nuclear power, oil and gas, the impacts of climate change, and criminal acts such as blackmail. These tensions are often exacerbated by the economic value of the energy source itself, the dependence on specific energy suppliers, the uneven distribution of wealth, the lack of investment in technology and competence, the lack of physical protection, and carbon dioxide emissions from energy operations. Oil and gas projects fulfil many of the prerequisite characteristics for tension and conflict exacerbation.

As the green energy transition evolves, the question of how to ensure that renewable energy does not bring with it the same conflicts that the energy projects of the past have, is pertinent. Lessons learned from what has and has not worked for non-renewable and renewable energy projects could provide useful analysis as to how decentralized renewable energy could reduce potential for community tensions leading to violent conflict.

Not all renewable energy systems have the same characteristics. The widescale use of bioenergy is more likely to intensify local conflicts related to its effect on natural resources availability, through competition over land use and water, and the resource curse. In addition, bioenergy as a product can be used as a source of revenue to fund intrastate conflicts. Large-scale renewable electricity systems using wind, hydro or solar photovoltaic (PV) can agitate community relations, and in fragile regions be vulnerable to hostile attacks which contribute to conflict in a similar way to fossil fuel-based systems. Large-scale renewable energy projects could increase the risk of local instability in societies which lack sufficient institutional capacity, are excluded from decision-making processes, and where livelihoods are negatively affected by the project. Rights-based approaches to renewable energy projects, which incorporate human rights in policies alongside public participation, can increase local support and thus result in more effective, coherent, legitimate and sustainable projects. Potential conflict becomes less of a risk when the transition to renewables is part of an inclusive decision-making process which prioritizes human rights over financial or political gains.

Prevention of destructive or violent conflict around natural resources can be understood as a process of peacebuilding—creating the personal and institutional capacities needed to handle conflict constructively, and addressing the root causes that lead to destructive conflict such as inequality and marginalisation. A decentralized approach to renewable energy projects, where projects are part or fully owned by local communities for the benefit of local communities, could combine energy provision with a peacebuilding approach.

## Chapter I – Conflict and Energy

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### The role of participation processes

The fulfilment of procedural rights, including effective public participation in decision-making, contributes to more transparent, better informed and more responsive environmental projects.<sup>1</sup> Community-based management builds shared understanding and acceptance of resource-sharing rules, while also building capacity for dialogue and negotiation, reducing the likelihood of destructive conflict.<sup>2</sup> However, superficial or exclusive participation processes can exacerbate unequal access to and distribution of resources by severely disadvantaging groups with less social influence, knowledge of negotiation language or familiarity with negotiation procedures. Such insufficient processes can also worsen social marginali-

sation by excluding traditionally vulnerable groups, who are often not readily accepted as legitimate participants in public decision-making.<sup>3</sup>

### Defining conflict

Conflict in itself is not negative. Conflict will always occur as an unavoidable part of life and if harnessed constructively, can provide an opportunity for positive change. However, if conflict is not handled correctly, it can become destructive, leading to a breakdown in communication among local or international groups, damaging social relations and exacerbating tensions that can even eventually lead to violence.<sup>4</sup>

A community experiencing high levels of fragility is more susceptible to conflict and even violent conflict. The Organisation for Economic Co-operation and Development defines fragility as ‘the combination of exposure to risk and insufficient coping capacity of the state, system and/or communities to manage, absorb or mitigate those risks. Fragility can lead to negative outcomes including violence, the breakdown of institutions, displacement, humanitarian crises or other emergencies.’<sup>5</sup> The potential for a community to experience violent conflict can depend on existing conflict-exacerbating factors and the strength of the country’s institutions in dealing with such factors.

When the term conflict is used throughout this paper, this is not just referring to violent conflict, but also to diverse and complex tensions within communities which may never lead to violence.

### Links between conflict and natural resources

Environmental challenges, including natural resource management, can become the focus of destructive conflict when measures that protect the human rights of communities are not taken. Competing claims on resources and different understandings of resource use challenge effective natural resource management. Large-scale natural resource investments can deepen power imbalances around resource access, with local groups often not permitted, or not able, to have a voice in decision-making. When agreements over natural resource investments fail to recognise community rights, this is the first step to community tensions and potential conflict. An absence of clear rights over their own natural resources is often a barrier to community participation in decision-making. In many countries, land, forests, fisheries and other natural resources belong to the State, and there may not be a legal requirement to consult with local communities before national decisions are taken. This can be a major barrier to equitable natural

resource management and to the prevention of destructive conflict over natural resources.<sup>6</sup>

There are certain international mechanisms which have attempted to increase transparency, inclusivity and participation in decision-making processes, in order to prevent destructive conflict relating to the environment. For example, Principle 10 of the Rio Declaration on Environment and Development aims to provide a rights-based response to these challenges in pursuit of sustainable development. Numerous international standards oblige governments to consult with stakeholders in decisions and policies relating to natural resources. One comprehensive agreement is the 1998 Aarhus Convention of the United Nations Economic Commission for Europe. The Convention clearly defines three pillars of public participation in environmental matters: access to information, participation in decision-making, and access to justice in environmental matters. Governments must provide information on the potential impact of proposed activities and alternatives, informing the public in an adequate, timely and effective manner. Governments should also provide an independent grievance mechanism, and implement national policy without discrimination to citizenship, nationality or domicile.<sup>7</sup>

A 2009 United Nations Environment Programme report<sup>8</sup> concluded that natural resources played a role in at least forty percent of all internal conflicts in countries. Access to and distribution of natural resources such as minerals, fuels, products of the land and the land itself have all been a common denominator in many instances of contention and violent conflict between social groups and states during the whole history of humanity.<sup>9</sup> Damaged or degraded natural environments can also leave human populations more vulnerable to natural disasters, disease, food shortages and other crises, which can increase the odds of community tensions flaring.<sup>10</sup> Energy systems, which are intricately linked to natural resources either in extraction, in pollution or both, can also frequently exacerbate conflict and even violence.

### **How is conflict connected to natural resources and energy supply?**

When local needs and contexts are not adequately taken into account, or responded to by natural resource projects, tensions around natural resources can be exacerbated. Similarly, tensions can rise when civil society groups and local communities are not able to have a voice in resource management or hold decision-makers accountable. This can result in management rules and practices that are unclear, contradictory or perceived as illegitimate by certain groups. It can also mean that typically vulnerable groups

such as women, small-scale farmers and indigenous peoples are excluded from decision-making and resources. This increases the likelihood of community tensions that could escalate to conflict later.<sup>11</sup>

Commercial resource extraction and large-scale infrastructure projects, such as dams, can be a source of conflict where governance is undemocratic and corrupt. The economic benefits typically accrue only to a small domestic elite and to multinational companies and their shareholders, while the local population (most often poorer communities, minority groups, and indigenous peoples) shoulder an array of social, health, and environmental burdens. Often, it is indigenous communities that are confronted by the operations of oil, mining, and logging firms. Examples include Nigeria's Niger Delta (oil), Indonesia's Aceh and West Papua provinces (oil, gas, gold, timber), Papua New Guinea's Bougainville island (copper), India (dam-building for irrigation), and Guatemala (dam-building for power generation).<sup>12</sup>

Low-cost and readily available energy is viewed as important for a stable and well-functioning society, and the reliance on fossil fuels continues to promote industrialized economic development. Yet fossil fuel resources, specifically coal, oil and natural gas, have also contributed heavily to several of the most important environmental crises, from extensive degradation of eco-systems to rising greenhouse gas (GHG) emissions that threaten catastrophic global temperature rises.<sup>13</sup> Energy resources and their supply chains increase the risk of conflicts in communities through environmental destruction, while power struggles can arise when actors disagree on who should control and access globally scarce but locally abundant resources.<sup>14</sup>

When the energy supply system of a state is a potential source of tension and conflict, such as those powered by fossil fuels, and this system coexists with fragile institutions within the country, tensions can lead to violent conflict. In countries with well-functioning institutions, community tensions may rise significantly, but are at less risk of escalating into widescale violent conflict. However, placing energy projects which have conflict-inducing characteristics, such as oil and gas in particular, into regions without the strong institutions to resist these exacerbating factors is a risk for escalation.

Energy can be the cause itself of tensions within a country<sup>15</sup>, potentially leading to conflict, and this is mainly due to the economic and political importance of the energy source and who owns it, the physical and technical characteristics of the energy carriers and the environmental consequences of the energy use. Making sure that these

economic, political, technological and environmental risk factors are reduced can produce an energy system which is less likely to exacerbate insecurities and lead to conflict. Fossil fuels, nuclear and hydroelectric power, all produce higher conflict risk factors in this context.

## Chapter 2 – What is the historical connection between fossil fuels and conflict?

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### Fossil fuels – a legacy of conflict

Traditionally, oil and gas projects have played a central role in providing energy to much of the world. Fossil fuel projects bring many of the risk factors to conflict into communities. Whether it be the economic value of many fossil fuel resources, dependence on specific energy suppliers, the resource curse, uneven distribution of wealth or the use of fossil fuel resources in political negotiations, there are various potential conflict exacerbations at play with this type of energy.<sup>16</sup>

### Oil

Taking oil as an example of one particular fossil fuel which has played a significant role in past conflicts, it has been found that a tendency for reliance on oil wealth had anti-democratic effects, particularly in poor countries.<sup>17</sup> The link between oil and authoritarianism may be due to a combination of social and political factors that work to reduce the voice of the public in the decision-making processes around oil projects. There has been a historical connection established between the access to oil and the concentration of economic and political power, evidenced for example by the consolidation of the oil industry.<sup>18</sup> Oil and its associated accumulations of wealth and power have gone hand-in-hand throughout history.<sup>19</sup>

Echoing these thoughts, it has been perceived that the conflict-exacerbating effects of oil are not just due to resource wars over possession of oil reserves, but the political effects generated by the oil industry. This includes ownership and market structure, producer politics and consumer access concerns. Many of the oil-related conflicts in past years have fallen broadly under one of these three categories. Between one-quarter and one-half of interstate wars since the beginning of the modern oil age in 1973 are connected to one or more of these oil-related causal mechanisms.<sup>20</sup>

### Natural Gas

Concerning natural gas, the Liquefied Natural Gas (LNG) project operations of ExxonMobil and Oil Search in Papua

New Guinea began in 2014 and have since been linked to human rights violations and resulting conflict. The apparent lack of promised benefits caused frustration amongst local communities, leading to escalating violence in the Hela province, facilitated by the widespread proliferation of weapons. Tensions came to a head in 2018, after the PNG LNG project's operations in Angore, Hela Province, were suspended in June, when protesters set fire to construction equipment.<sup>21</sup>

In October 2016 in the UK, the government overturned the local government's refusal to allow Cuadrilla's test drilling for hydraulic fracking of natural gas in Lancashire; and started constructing four wells. The site is the largest fracking development in the UK, and the first where permission has been given for horizontal drilling under homes. In response, there was daily resistance, energetic protests and blockades, with residents joined by supporters from far and wide with concerns about fracking being implicated in earth tremors, water contamination, GHG emission rise, and impacts on health and with a range of illnesses reported by those living near to sites.<sup>22</sup>

### The Resource Curse

The resource curse refers to the failure of many resource-rich countries to benefit fully from their natural resource wealth. Resource-rich countries tend to have higher rates of conflict and authoritarianism, and lower rates of economic stability and economic growth, compared to their non-resource-rich neighbours.<sup>23</sup> If abundant energy resources in one region provide power to a whole nation, this can cause regional insecurity. This often happens if the country is experiencing uneven distribution of wealth, corruption and reduced incentives to build functioning institutions.<sup>24</sup>

This process has been witnessed in several countries around the world including, for example, in Nigeria<sup>25</sup>, Venezuela<sup>26</sup> and Angola<sup>27</sup> with their oil resources. Although the degree to which this leads to conflict or violent conflict depends on the country context and institutions.

### A global change in the energy market

A change is underway in the global energy market and many of the oil and gas resources that provided energy for the world in years past are not being recognised as part of a global low carbon future. The new fields being brought on line to take their place are, on average, smaller and harder to exploit. Many of the new sources of energy which have been proposed - such as Brazil's "pre-salt" petroleum reserves deep beneath the Atlantic Ocean, Canadian tar sands, and American shale gas - require the utilisation of

sophisticated and costly technologies, which increase GHG emissions. This is at a time when current emission levels, if not rapidly reduced, could raise global mean surface temperature to a catastrophic 4°C above pre-industrial levels by 2100.<sup>28</sup> Global energy supplies are growing at a slower pace and are continually falling short of demand. This adds to the upward pressure on prices, causing tension among countries lacking adequate domestic reserves and increased power among those with an abundance.<sup>29</sup>

In seeking new energy sources, can the world learn from the mistakes of the past oil and gas projects and develop new energy projects which do not exacerbate conflict?

### Chapter 3 – Can renewable energy be a cause of conflict?

#### Potential Benefits of Renewable Energy

In comparison to fossil fuel extraction and combustion, sourcing energy through renewable technologies lessen the impacts of global warming through reduced GHG emissions. Renewable energy technologies also improve public health due to reduced air pollution (than if fossil fuels were used), and provide renewable energy supplies, jobs and other economic benefits which calm energy prices and provide resilient energy systems less prone to large-scale failure because they are distributed and modular, meaning an event in one location would not cut off power to an entire region, as there are numerous individual energy sources.<sup>30</sup>

These potential benefits feed into the peacebuilding framework as a tension reducer within communities. However, it is not just fossil fuel projects which generate conflict. Renewable energy, when not implemented strategically, can have potential negative impacts on food security, the environment and in turn, can exacerbate conflict.

#### Biofuels and food security

The increase in the popularity of biofuels helped to increase food prices anywhere from three to 30 percent during the 2008 and 2010 global food price crises. During this period, food price volatility and higher prices led to protests, food riots, social and political unrest, and civil conflict in more than 40 countries with more fragile social, economic and political contextual factors.<sup>31</sup>

For example, biofuel projects ignited land and environmental disputes in Kenya's Tana River Delta. They also threatened local community livelihoods by affecting the water flow into

the Tana River Delta. The projects particularly threatened the Orma pastoralists by compromising their access to grazing lands and water sources. In response, villagers initiated two court cases to halt the development efforts.<sup>32</sup>

#### Hydropower

There have been many well-documented conflicts and disputes over hydropower projects around the world.

The construction of the Rogun Hydropower Plant in 1976 in the Amu Darya Basin created conflict between Tajikistan and Uzbekistan regarding the use of their shared fresh water resources.<sup>33</sup>

The Alta hydropower project in Norway led to issues around the violation of the Lappish minority rights in the 1980s and created one of the most dramatic political conflicts in Norway since World War II. The location of the project was in one of the core areas of Lappish settlement. In 1980, a police action was called to the project involving 10% of the total Norwegian police force.<sup>34</sup>

In Colombia between 1980 and 2010, the building and installation of thirteen hydroelectric plants led to three consecutive time periods in which conflicts were generated by the installation of the mentioned plants.<sup>35</sup>

Additional conflicts generated over dam construction and irrigation include India's Sardar-Sarovar dam in 1979, and the Diama dam along the Senegal River involving Senegal and Mauritania in 1986 and China's Three Gorges project in 2008.<sup>36</sup>

#### Rights-based decentralized ownership

Despite some of the pitfalls of large industrial renewable energy projects, there are still many potential benefits to be gained for communities from renewable energy.

Decentralized renewable energy (DRE) refers to renewable energy that is generated off the main grid, including micro-renewables, heating and cooling. It can refer to energy from waste plants, combined heat and power, district heating and cooling, as well as geothermal, biomass, wind or solar energy. Schemes can serve a single building or a whole community, even being built out across entire cities.<sup>37</sup>

Projects which are decentralized in ownership and are implemented using a rights-based approach contribute to peacebuilding within communities. This is because these approaches can reduce factors typically related to energy resource-exacerbated conflict.

## Chapter 4 – What potential role does renewable energy have to play in peacebuilding?

Fossil fuels and renewable energy implemented on an industrial scale both risk multiplying conflict. Yet rights-based approaches, including decentralized ownership, can establish a peacebuilding framework within the context of a global green transition.

### Peacebuilding and Conflict Prevention

Peacebuilding is both the development of human and institutional capacity for resolving conflicts without violence, and the transformation of the conditions that generate destructive conflict. In this sense it is closely allied to the prevention of destructive conflict and is not only relevant to post-conflict settings.<sup>38</sup>

Policy and practice that facilitate improved collaboration among conflicting groups is essential for effective governance. Peacebuilding methods such as locally-led conflict analysis, facilitation of dialogue among groups with competing interests, and empowerment of vulnerable groups can help to build cooperative and trust-based relationships around natural resource management. It is not only technical skills that need to be strengthened, but the skills that enable stakeholders to engage with decision-making, communicate effectively and address or mediate disputes constructively. Policy and practice needs to build capacity for these skills among actors at all levels - from government representatives, to stakeholders from the private sector, to local communities.<sup>39</sup>

When renewable energy is primarily for export, and improvements in local energy security do not materialise, appropriate and commensurate compensation packages to local communities whose resources are being extracted need to be ensured. Care needs to be taken that compensation for accessing natural resources for energy production is not perceived to be inadequate to restore local livelihoods or to be inequitable between different groups. New jobs through renewable energy production may help to partly offset adverse impacts. Guarding against increasing grievances and inequalities among groups, and displacing poor and marginalised communities from land essential to their livelihoods is crucial.<sup>40</sup>

Compared to fossil fuels, renewable energy offers many perceived advantages including the relative availability of renewable resources, the access to and flexibility of their enabling technologies, a less polluting form of energy and the potential for new forms of ownership.<sup>41</sup> As can be seen in Figure 1, renewable energy with the exception of hydropower brings low risks of conflict related to the use of primary resources as they are abundant and geographically widespread. In terms of international trade, mutual benefits can be achieved from increased (regional) trade of energy and interdependence. For their conversion and distribution, the small-scale energy systems have a low risk of being attacked. However, the larger renewable energy systems bring the same risks of attack as fossil fuels. Biofuels, especially their production and distribution, can cause local conflicts. Also, in terms of being vulnerable to being used to gain political power, renewable energy resources are more evenly distributed and production covers larger areas, meaning it can be difficult to secure and exert control over the resources. As a consequence, with a renewable energy system, it becomes less beneficial, economically but also geopolitically, for one group or one actor to forcefully take control of those energy resources to gain political leverage.<sup>42</sup>

*Figure 1: A summary of the interactions between renewable energy systems and conflict, (Månberger, 2015).*

Stage in the supply chain	Bioenergy, biofuels	Renewable electricity (wind, hydro, solar PV)
Primary resources	More likely to interact with local conflicts (social instability) than interstate conflicts, because resources have low power density and are geographically widespread, but large land requirement and low entry barriers for production.	Low risks of interstate and intrastate conflict, since resources are abundant and geographically widespread and there are entry barriers to production that restrict opportunities for belligerents. An exception is hydropower which can increase tension between local actors and states that have insufficient institutional capacity.
International trade	Low risk of conflict, since the number of exporters is assumed to be high in a decarbonised future.	More likely to incentivise interstate collaboration than conflicts, since mutual benefits can be achieved from increased (regional) trade and interdependence.
Conversion and distribution	Similar risk as current systems for liquid fossil fuels, since the system has similar structure (e.g. energy density of bottlenecks).	Small-scale systems have a very low risk of being attacked (i.e. used as a conflict means). Large-scale systems that utilise control systems are exposed to virtual attacks from hostile states. The risk of physical attacks is similar as for fossil systems

Renewable energy is also connected to a low-carbon future and climate change mitigation strategies. Rapid access to low carbon forms of energy will be able to reduce the current rate of GHG emissions, in turn reducing the potential for catastrophic global climate change.<sup>43</sup> The effects of climate change can also be exacerbating factors of conflict. Reduced access to water and extreme weather events can negatively affect food security and undermine the livelihoods of vulnerable households and communities. Growing natural resource scarcity can lead to local competition and displacement which becomes unmanageable in the absence of internal processes and institutions for conflict resolution. States and communities affected by fragility, and with a history of conflict, are the most vulnerable. Ensuring all countries' transition to a low carbon economy with more DRE is a long-term strategy for global peacebuilding.<sup>44</sup>

Renewable energy can also help to mitigate some of the costs to society which fossil fuels bring in relation to pollution. Fossil fuel extraction processes generate air and water pollution, which affect the health of local communities. Transporting fuels from a mine or well can result in air pollution and can lead to serious accidents and spills. When the fuels are burned, they emit toxins and global warming emissions. Even the waste products are hazardous to public health and the environment.<sup>45</sup> Pollution in local communities as a result of industrial activity has been linked to conflict, when poor and marginalised groups suffer the environmental and health consequences of development.<sup>46</sup> Renewable energy does not produce the same levels of air and water pollution. Wind, solar, and hydroelectric systems generate electricity with no associated air pollution emissions and wind and solar energy require essentially no water to operate and thus do not pollute water resources.<sup>47</sup>

### **Reducing the Risk of Conflict with Renewable Energy**

As previously highlighted, not all renewable fuels have the same characteristics, which means certain renewable energy resources are more appropriate as part of peacebuilding strategies than others. However, ecological conflicts<sup>48</sup>, caused by the use of land and renewable resources for energy purposes, can be prevented if the transition to renewables is part of an inclusive sustainable development and the livelihood of local actors is not threatened. Distributed and decentralized energy can help to reassert democratic control over energy sources and development and avoid some of the pitfalls of fossil fuel projects and large-scale, industrialised renewable energy projects.<sup>49</sup> With this in mind, DRE systems owned by or directly supplying local communities reduces some of the potential conflict risks of fossil fuel and large-scale renewable energy systems.

### ***DRE in ACTION:* Feed-in Tariffs in Denmark and Germany**

By 2010 in Europe, several countries could boast of renewable energy generation that represented a significant portion of their supply mix: for instance, 20 percent in Denmark and 13 percent in Germany (which had risen to 31% by 2015).<sup>50</sup> These numbers have been achieved in a relatively short time and reflect the effects of Feed-in Tariff mechanisms. Feed-in Tariffs provide a standard price for renewable energy installations, vary by technology and provide long-term contracts.<sup>51</sup> Feed-in Tariffs have made it possible for communities, cooperatives, and landowner collectives in places like Denmark and Germany to pool their resources and put up their own turbines and solar panels. When resources are pooled, even the poorest in the communities can also benefit from renewable energy in their homes and lessens the inequality in resource allocation.

In Denmark, for example, wind turbines were legally required to be owned by electricity consumers. Danish wind projects are typically owned by several to several hundred landowners and farmers in "wind partnerships" (due to the largely rural base of the Danish population). The result is that 20% of Denmark's power comes from wind, and 85% of that is owned by the residents of Danish communities.<sup>52</sup>

Energiewende is the name for the energy transition in Germany, a full-scale transformation of society and economy that triggered a strong increase in renewable energy supply in the country. It endorses a general vision of an alternative society based on decentralized structures, bottom-up processes, participatory democracy, and environmentally conscious economies with decentralized, renewable power supply with many smaller, localised producers. Today, there are more than one thousand participants in Germany's electricity market, the vast majority of which do not own power plants or supplier networks. Mostly small actors, like farmers, co-ops, citizen-led groups, and other non-industry companies, have invested in green energy production, mostly thermal and solar PV, bio-energy and onshore wind technology.<sup>53</sup> In Germany, about 50% of renewable energy projects are community owned, with more than 100,000 individuals owning a stake in a wind project. For solar PV, people could get a loan from government owned development bank (KfW) and energy companies were required to purchase the electricity generated at guaranteed subsidised electricity rates, which in turn paid back the loan directly until the solar panels were fully owned. This inclusivity meant that wealth did not factor into who was able to benefit from the renewable energy boom.<sup>54</sup>

## Chapter 5 – The Potential of DRE in Peacebuilding Strategies

There are a variety of benefits of the DRE model beyond electricity output.

Matching supply and demand is an important component of reducing conflict over energy. Using the complete variety of DRE technologies is a first step to ensure system stability. There is a higher fluctuation in photovoltaic and wind power-based electricity production across day and year so mixing this with hydroelectric, geothermal, and biomass-based power production has the potential to provide base load capacity and reduce fluctuations in energy supply.<sup>60 61</sup>

Energy systems can always be vulnerable to becoming targets for and sources of conflict. However, energy technologies based on concentrated energy sources, such as fossil fuels and certain large-scale renewable projects, have the potential to enable more concentrated forms of money and power and centralised or authoritarian political relationships. They can also be a target for those wishing to take control of the energy source to gain political control. DRE technologies, drawing directly from renewable and primary sources, enable more distributed political and economic power.<sup>62</sup> DRE systems with a high level of resilience have a low risk of being a source or target of conflict because the effects of an attack would be low.<sup>63</sup> Bottom-up community-based renewable energy projects developed by citizens are more likely to be accepted by the public than top-down projects developed by large companies.<sup>64 65</sup>

Decentralized energy supports the decentralization of authority, favouring community control and ownership of renewable energy resources rather than extending the legacy of corporate ownership.<sup>66 67</sup> Decentralized authority means greater self-reliance, local approval and planning, as well as greater local accountability and responsibility for social and environmental impacts of electricity use.<sup>68 69 70</sup> Community-scale projects could support local economic circulation (i.e. the multiplier effect<sup>71</sup>) and local income via sales and returns on investments and create more local jobs than large-scale projects, while creating opportunities for residents to be owners and decision-makers.<sup>72 73</sup>

By retaining economic benefits locally and sharing benefits more broadly, the DRE model is expected to build a stronger political constituency.<sup>74</sup> This can build relationships among neighbours and the capacity for self-reliance among communities, allowing people and communities greater autonomy from currently dominant institutions.<sup>75 76</sup>

### *DRE in ACTION:* **Deployment of DRE for Peacebuilding in 2016**

In 2016, projects deploying solar systems to multiple hospitals and clinics were implemented in Ghana, Malawi, Namibia, Pakistan, Uganda and Zimbabwe.<sup>55</sup> Also in 2016, an initiative aimed at improving school access to electricity deployed multiple systems in Zambia.<sup>56</sup>

Humanitarian efforts led to installations of DRE systems as part of reconstruction and stabilisation initiatives in Puerto Rico, the State of Palestine, South Sudan and Syria.<sup>57</sup> Under the initiative of the United Nations High Commissioner for Refugees, refugee camps in Jordan, Kenya, Lebanon and Rwanda were equipped with solar systems to improve camp power supply, provide light in schools and improve the lives of individual refugees.<sup>58 59</sup>

### *DRE in ACTION:* **DRE Used For Managing Natural Resource Conflict in Sudan**

United Nations Development Programme installed solar powered water pumps as part of the Community Security and Stabilization Programme<sup>77</sup> in six states of Sudan. Scarcity of water in Sudan is known to cause conflict between and within communities. Added to this is the increased pressure on water resources due to a high presence of internally displaced persons within communities. Solar-powered water pumps were installed, servicing a total of 200,000 people from 8 localities with a steady supply of water.

In contrast, diesel-powered pumps were costlier as they required a consistent supply of diesel. This can be expensive in the long run and leaves the community susceptible to price hikes of diesel. Also, solar pumps are useful because they bring access to water to regions not connected to the national grid and where electricity provision is minimal. The distribution of water and maintenance is managed by Water Management Committees. The profits go to the local water corporation who are the caretakers and security guards at the pump.

### ***DRE in ACTION: DRE Used for Social Justice***

DRE can both be a tool to empower local communities and democratise energy provision. In 2016, the International Organization for Migration sought to tackle gender violence and trafficking in the Central African Republic. Their strategy included direct assistance to at-risk households identified in communities known for high prevalence of sexual and gender-based violence (SGBV) through provision of housing kits and the installation of 50 solar-powered street lights. Community members were given responsibility for one or more solar lights

in the vicinity of their house. The solar lights were successfully managed by the communities themselves, meaning that the community's social cohesion was used and strengthened in the fight against SGBV, an important part of any peacebuilding strategy.<sup>78</sup> The DRE not only empowered communities in what remains a very top down governance system from Bangui, but it also reduced the risk of violence through the light it provided and enhanced education as students were able to study way into the night.

### **Risks of DRE**

DRE can come with risks of its own when placed within country contexts which are not conducive to effective local cooperation to manage the energy system. Particularly if the region has weak local administrative or technical capacity, inadequate financial resources available to perform new local responsibilities, or inequitable distribution of resources. Decentralization can also allow local elites to capture control over the functioning of local energy sources.<sup>79 80 81</sup>

For DRE systems to be less likely to fall into this trap, there need to be mechanisms to prevent elite capture, strong administration and technical capacity at the local level, strong local and national political commitment, initiatives for local capacity-building, strong legal frameworks for transparency and accountability, and an effective local judicial system and anti-corruption bodies to prevent corruption.<sup>82</sup>

### ***DRE in ACTION: DRE Risks—Lucingweni village***

To increase access to clean energy in South Africa, there have been various projects aiming to expand the market of green mini-grid installations serving rural villages unconnected to the main grid.

In South Africa, between 2002 and 2003, a green mini-grid in the Eastern Cape was installed in the village of Lucingweni. The Lucingweni village mini-grid was vandalised soon after installation and never reached full capacity. Some of the key issues around the project not fulfilling its potential include the fact that ownership was never transferred to the local authority, capacity building to be able to maintain the system was not provided and there was no long-term plan with regard to who would operate the mini-grid, tariff levels, usage levels, etc. It was a technology project rather than one that supported the community's capacity to own the DRE project and reap the potential benefits.<sup>83</sup> These are key components of peacebuilding for better natural resource management that were not fulfilled.

## Conclusion

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With fossil fuels having been traditionally linked to many local, regional and national conflicts, it is critical to avoid a repeat of such suffering as we enter a low-carbon world. Can energy ever be used as a tool for peacebuilding instead of a cause of conflict?

Renewable energy systems, with the exceptions of bioenergy and hydropower, have a lower risk than fossil fuels of exacerbating or causing conflict. As primary resources, they are abundant and geographically widespread, and mutual benefits can be achieved from increased regional, national and international trade and interdependence. Also, in terms of being vulnerable to being used to gain political will, renewable energy resources are more evenly distributed and production covers larger areas. This means it can be difficult to secure and exert control over the resources. As a consequence, with a renewable energy system, it becomes less likely, economically but also geopolitically, for one group or one actor to forcefully take control of those energy resources to gain political leverage.

In addition to these factors, renewable energy is connected to a low-carbon future and climate change mitigation strategies. Rapid access to low carbon forms of energy will be able to reduce the concentrations of GHG emissions being released, in turn reducing the impacts of climate change. Ensuring all countries' transition to a low carbon economy with more DRE is a long-term strategy for global peacebuilding.

Ownership of DRE systems by local communities reduces some of the potential conflict risks of large-scale renewable energy.

DRE technologies, drawing directly from renewable and primary sources, enable distributed political and economic power. DRE supports the decentralization of authority, favouring community control and ownership of renewable energy resources rather than extending the legacy of corporate ownership.

Decentralized ownership means greater self-reliance, local approval and planning, as well as greater local accountability and responsibility for social and environmental impacts of electricity use. Community-scale projects could support local economic circulation (i.e. the multiplier effect) and local income via sales and returns on investments and create more local jobs than large-scale projects, while creating opportunities for residents to be owners and decision-makers.

By retaining economic benefits locally and sharing bene-

fits more broadly, the DRE model is expected to build a stronger political constituency. This can build relationships among neighbours and the capacity for self-reliance among communities, allowing people and communities greater autonomy from currently dominant institutions. If projects are decentralized in ownership and put the rights of people first, more of the renewable energy benefits which contribute to peacebuilding in communities can materialise, rather than the risk factors to conflict.

DRE has already begun to be used in peacebuilding projects around the world. The full potential of this form of energy has not yet been reached and may well play a much larger part in the peacebuilding projects to come. As we look to an increasingly green future for energy, can we employ low carbon technology with rights-based, decentralized ownership established within a peacebuilding framework? With this place, we could finally see energy resources becoming a road to peace instead of conflict.

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