

## **Here Comes the Sun? Experimenting with Cambodian Energy Infrastructures**

*Casper Bruun Jensen, draft version.*

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As if it was not already obvious from traversing Phnom Penh's scorching streets, the abundance of Cambodian sunshine was brought to my attention during a visit to the industrial outskirts of the southwest city. Sitting around the corner from the Khmer Electrical Power Co, Ltd., and a few blocks from Street Solar, this was the location of the new office and manufacturing plant of the Melbourne based solar energy company Star8. Covered in multi-colored solar panels, the building would not look out of place in a Californian innovation hub. Certainly, it offered a startling contrast the dubious looking garment factories surrounding it. As my Hungarian guide to the facility explained, one of the main benefits of pushing the solar agenda from Cambodia is that there is three times more sunlight than in Central Europe.

Inside the Star8 building, the lobby doubles as a high tech showroom. It contains small model houses covered in elegantly futuristic solar panels. Also featured are solar streetlights and an assortment of more curious products. Among them, one finds what looks like a small handbag, which can be unfolded to display eight mini solar panels. Coming at a price of 250\$, it can be placed on top of a car and used to recharge mobile phones or other devices using a USB port. Next to it is a solar parasol cover able to provide electricity for computers and phones while sunbathing. There are solar cooking and barbecuing devices, rather scary looking, since they can't be turned off. And there are solar panels wrapped in camouflage, "for army excursions into the jungle," as helpfully explained by the guide, himself an ex-member of the UN peace keeping mission that came to Cambodia in the early 1990s aftermath of the Khmer Rouge regime of terror.

Seated in comfortable chairs in the lobby, the general manager offers further information. Star8 is only five years old, he explains. It grew out of Australia, but presently it has offices in Singapore, Bangkok, Manila, Myanmar and Cambodia. The Phnom Penh office opened recently, in February 2014. However, things are moving extremely quickly right now.

One does not have to take the manager's word for that. According to UNEP's 9<sup>th</sup> "Global Trends in Renewable Energy Investment 2015," green energy investments increased 17% in 2014, to \$270 billion.<sup>1</sup> Investments in solar power alone went up 29%. The leader in this surge is China, followed by the US, Japan, and several other countries: Brazil, India, South Africa, Mexico, Indonesia, Chile, Kenya and Turkey. Only Europe lags behind.

The general manager has two explanations for why Star8 has opened an office in Cambodia. Repeating that there is a lot of sunlight in Cambodia, he adds that labor is also very cheap. This second answer makes the solar products on display in the lobby appear in a different light. Those expensive barbecues and parasol covers are of course for export. Maybe all of this has little to do with creating a platform for renewable energy in Cambodia after all.

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In the grand scheme of things, solar energy is insignificant for the country. In terms of attention and investment, everything revolves around hydropower development on the Mekong and its tributaries. There have been plans to build such dams since the mid-20<sup>th</sup> Century but they only really began materializing in the late 1990s, when China went ahead with several dams upstream. A decade later, companies and governments are pushing ahead lower Mekong dam projects in Laos and Cambodia.<sup>2</sup> Behind these projects lie dreams of energy-induced development radically different from those that invigorate proponents of solar energy.

So far, hydropower generated electricity sets practically the whole agenda for Cambodian energy futures, while solar energy is barely a blink on the radar. This situation provides the impetus for the following discussion, which examines Cambodian energy infrastructures with a view to create some wiggle room for solar energy infrastructures to thrive. As I suggest, this depends on developing an analytics

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<sup>1</sup> FS-UNEP Collaborating Centre for Climate and Sustainable Energy Finance. 2015. Global Trends in Renewable Energy Investment 2015. <http://fs-unep-centre.org/publications/global-trends-renewable-energy-investment-2015>. (Accessed 6 May 2015).

<sup>2</sup> Tiếng Việt. 2013, March 28. The Lower Mekong Factsheet Text. <http://www.internationalrivers.org/resources/the-lower-mekong-dams-factsheet-text-7908>. (Accessed 24 March 2015).

of infrastructures as ontological experiments (Jensen and Morita 2015). What comes into view is an energy landscape comprised of multiple ontological test-sites where energy and people are mutually transformed *via* their encounters in and as infrastructure, and where solar energy could prevail, against the odds.

### **Energizing Social Science**

It is not only in the realms of politics and business that questions of energy, its promises and dangers, are viewed with urgency. Across the social sciences, too, one can witness a surge of interest in energy infrastructures. It has become increasingly obvious that the resource arrangements that allow people, cities, countries and regions to meet energy needs are of crucial importance not only for understanding political and economic developments but also social and cultural relations.

Recently, the anthropologist Dominic Boyer has proposed ‘energopower’ as an analytical category to complement, if not replace, Foucault’s trope of biopower. If post WW2 energy regimes were characterized, he writes:

by promises of endless growth [that] were defined above all by a remarkable integration of energetic systems (transnational oil and nuclear energy) and biopolitical order (Keynesian welfarism), then since the 1970s the world has experienced an accelerating process of dis-integration in which the seams between bios and energos are increasingly taut and visible. What comes next is abundantly unclear (Boyer 2014: 328)

Whereas the “dominant carbon energopolitical regime is increasingly disrupting and poisoning life across the world ... at the same time we glimpse fascinating new mutations in that regime’s discourse and techniques of governance with the appearance of new anthropocentric and ecocentric biopolitical imaginaries responding to climate change. Energopolitical crisis is generating biopolitical effects and vice-versa” (328). Accordingly, as Boyer sees it, energy must move to the forefront of social scientific concerns. However, it is less clear what to do with this realization, for taking it on board requires the social scientist to move outside his or her comfort zone.

Sarah Strauss *et. al*’s edited volume *Cultures of Energy* (2013) exemplifies

some of the challenges. The editors are emphatic “that human use of energy is understood and experienced through cultural frameworks... the enormous energy challenges facing us all are fundamentally cultural and political rather than technological (Strauss, Rupp and Love 2013: 10). This leads to a focus on how people experience forms of energy, how they rely on it, and how it is harnessed “to construct socially meaningful worlds” (11).

These worthwhile questions are discussed in a range of contexts, but they are generally engaged from the point of view of peoples’ experiences and political contexts. Thus, although the editorial introduction insists that “an anthropology of energy must shuttle back and forth among laws of physics, opportunities and constraints of ecological systems, and processes of culture,” layers of reality which are “necessarily intertwined materially, rhetorically, and metaphorically” (2013: 12), the volume contains relatively little analysis of the technological systems, infrastructural arrangements, or material qualities of the energy sources.

In this light, the work of Leslie White, which has recently reemerged in writings on energopolitics (e.g. Boyer 2014), offers an interesting contrast. In his day, White was known not only for his battles with the Boasian school of cultural anthropology, but also for his adamant materialism, centering on the relations between energy and “the evolution of culture.” Observing that: “everything in the universe may be described in terms of energy,” White (1943: 335) derived two “laws of cultural development.” “Other things being equal,” he argued, “the degree of cultural development varies directly as the amount of energy per capita per year harnessed and put to work,” and, “the degree of cultural development varies directly as the efficiency of the technological means with which the harnessed energy is put to work” (338).

The obvious rejoinder was that other things were rarely equal. Nevertheless, the recent reappearance of White’s in the landscape of energy analytics suggests that discontents rumble under the surface of culture-centric analyses. Thus, for example, one dimension of Boyer’s energo-political re-orientation is that *energy’s effects* are at least as consequential as peoples’ perceptions. Indeed, at a time of accelerating worries about anthropogenic global warming and the role of the oil industry, White’s observation, taken from the physicist R. M. Langer’s *Fast New World* sounds more plausible than ever: “The kind of civilization we might expect... is so different from

anything we know that even guesses about it are futile” (Langer 1940, cited in White 1943: 351). Leslie White, of course, was writing at a time when it was still possible to believe in technological redemption.<sup>3</sup> Later would follow innumerable crises induced by technology, eventually leading to such saturation that the power of crisis to motivate action itself began to decrease (Masco, this volume).

From the present vantage point, it is only too obvious that White’s depictions of energy’s evolutions relied on their own dubious socio-political assumptions. Indeed, despite insisting on the futility of predicting the future, his immediately preceding sentences did offer estimations, which from the present vantage point seem astonishing. “The face of the earth will be changed,” White quoted the physicist Langer, “Privilege and class distinctions...will become relics because things that make up the good life will be so abundant and inexpensive. Wars will become obsolete because of the disappearance of those economic stresses that immemorably have caused it” (Langer 1940, cited in White 1943: 351). Of these predictions, the only one still standing ominously before us is the first: “the face of the earth will be changed”...

In a context where all other things did indeed fail to stay equal, White’s energy determinism is obviously unsatisfactory as an infrastructural analytics. Yet, anthropological studies that focus on lived experience and sense making as if such experiences and categories were not themselves shaped by infrastructures (functioning, as it were, *as* life-worlds) are equally problematic. Accordingly, it is necessary to develop a decentered approach (Jensen 2016), capable of taking into account the material dimensions of energy infrastructures, the promissory discourses that surround them, the forms of social and political organization that support them, and the affects and experiences of people that imagine, build or use them *all at once*.

Moreover, as argued by Joseph Masco (this volume), given the current inability of crisis narratives to energize action, the varied forms of precarity catalogued by anthropologists must be supplemented by infrastructural analyses willing to take risks with articulating alternative futures. In the following, I develop one version of such an analytics by engagement with present and imagined Cambodian energy infrastructures.

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<sup>3</sup> The archetypal example is perhaps Jawaharlal Nehru’s passion for dams.

## **Experimental Energy Futures**

Infrastructural developments are entwined with imagined futures (Hetherington 2014, Nielsen 2011), like the one in which all Cambodians will have access to cheap electricity due to hydropower development. Often, of course, such promises are dashed due to endless postponements and the inability to complete projects (Namba 2016, Weszkalnys 2016), or because the resulting infrastructures are unable to deliver the promised services.

As infrastructural promise tends to be deferred to an indefinite future, to always point just around the corner, it might be said to embed a form of Lauren Berlant's (2011) cruel optimism. It is thus not surprising that anthropological studies of infrastructure often exhibit a narrative structure where high-minded promises give way to dismal failure. This hubris can then be juxtaposed with descriptions of the precarious lives of the people who should have benefited but never did. Such studies are very important because they capture a dynamic central to a great many infrastructure projects. At the same time, the bleak realism that makes these ethnographies so compelling is also a weakness because it often makes it very difficult to imagine any viable alternatives.

Recognition of the experimental qualities of infrastructure might be key to avoid diminishing collective capacity to imagine and work towards such alternatives. Because infrastructures are patched together by a vast array of incongruent elements, from laws to water flows and from cement to equations, they tend to gain in complexity to the point where no one is fully able to either understand or control them (Harvey, Jensen and Morita 2016: 7-11). Made up of transformable relations, and making new relations, they can be described as ontological sites of experimentation (Jensen and Morita 2015). On the one hand, it remains as important as ever for the anthropologist to grapple with present infrastructural realities. On the other hand, it is just as important to search for the cracks in such realities, as this is where pathways to different futures may be found.

The philosopher Paul Feyerabend (2001) offers useful guidance on this point. In advance of current preoccupations with ontology, he reminded us that a heterogeneous set of 'practically effective forms of life' are always in process of being built from incongruent elements. Such life forms, he wrote,

contain subtly articulated ontologies including spirits, Gods, dreams, animals, battles, rainbows, pains, etc. Each entity behaves in a complex and characteristic way which, though conforming to a pattern, constantly reveals new and surprising features and thus cannot be captured in a formula; it affects, and is affected by other entities and processes constituting a rich and varied universe (Feyerabend 2001: 10)

These ‘practically effective forms of life’ can be seen as *practical ontologies* (Gad, Jensen and Winthereik 2015), relational and transformable worlds made of such diverse things as rainbows and Gods, pains and dreams. While Feyerabend studiously avoids listing scientific or technological entities it is clear that they *also* comprise spreadsheets, tractors, Fourier transformations and microelectronics. If Feyerabend refrained from mentioning these kinds of things, it was probably because, contrary to dreams and spirits, their importance generally goes without saying.

Whether generated from massive dams or solar panels, energy is clearly also an ontological element, articulated with other elements in complicated, patterned ways. Some patterns appear so stable that analysts from the philosopher Manuel de Landa (1998: 31) to the politician and solar energy activist Hermann Scheer (2004, 2012) speak of different *general energy distribution systems*. Doing so, they describe decentralized, locally produced and exchanged forms of energy as starkly opposed to centralized systems that depend on complex processes of extraction and long supply chains. Yet even within this general dichotomous pattern, we might find surprises, not easily captured, as Feyerabend wrote, “in a formula” (2001: 10).

Complementing Feyerabend’s interest in the variety of practically effective forms of life, Vinciane Despret (2004) argues that novel experience depends on how we allow different kinds of new entities to enter our worlds. The importance of such new entities has everything to do with how we become able and willing to “attribute to [them] the power” to change us (Despret 2004: 58). Resonating with Gaston Gordillo’s (this volume) characterization of infrastructures as affective assemblages, Despret’s formulation encourages exploration of what solar energy might make us do. Far from a passive relation, it indicates that the capacity of solar energy to change established energy infrastructures depends both on an active imagination *and* on the active pursuance of new forms of materialization.

As Hetherington (2014) suggests, such processes of affective-material transformation mark moments when people become “enrolled in a community of aspiration” (see Carse, this volume). Now, in reality, the Cambodian solar community of aspiration remains tiny, and it has hardly led to any durable infrastructural change. Yet, rather than taking this actual situation as a solid fact, I use it as a vantage point for querying what it might take to get *out of it*.

In the following, accordingly, I am interested in how to move from a description of present realities to a mode of re-description that *opens towards* alternative futures that would thrive on new attitudes, imaginations and actions pertaining to solar energy. It is precisely due to a keen awareness that the odds are *in reality* stacked against such alternative futures (see also Wakefield and Braun this volume), that I find this ethnographic-conceptual movement so important.

### **Hydroelectric Promises and Threat**

When the Russei Chrum Krom river hydropower dam opened in January 2015, it was graced by the presence of Cambodian Prime Minister Hun Sen and the Chinese ambassador Bu Jianguo. China’s official news agency Xinhua reported that the dam would provide a reliable source of energy to a nation desperately in need.<sup>4</sup> The 338 MW dam, stated the chairman of the China Huadian corporation, was a historical milestone of economic collaboration between China and Cambodia. The Cambodian Minister of Mines and Energy Suy Sem explained that electricity “will be sold to the state-owned Electricity of Cambodia at the price of 7.35 U.S. cents per kilowatt-hour.” He estimated it would lead to annual tax revenues of 12.5M\$.

These kinds of promises have not gone unchallenged. The NGO *International Rivers* argues that all the planned dams will still only be able to deliver 6-8% of the projected regional power demand by 2025. Analysts and commentators, like David Roberts writing in the *New York Times*, noted that only about 10% of the power from the 11 projected dams on the lower Mekong will flow into the households and businesses of Laos and Cambodia. Most, instead, will be exported to “energy-hungry”

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<sup>4</sup> Tian Shaohui. 2015, January 12. Cambodia Sees Greater Electricity Supply After Chinese-Built 338MW Dam Begins Operations. *Xinhua News*. [http://news.xinhuanet.com/english/china/2015-01/12/c\\_133913817.htm](http://news.xinhuanet.com/english/china/2015-01/12/c_133913817.htm). (Accessed 24 March 2015).



Thailand, Vietnam, and China.<sup>5</sup> In its envisioned future capacity as a massive exporter of energy, Laotian Minister of Industry and Commerce Nam Viyaketh has advertised Laos as “the battery of Southeast Asia.”<sup>6</sup>

Responding to the ‘battery narrative,’ according to which Lower Mekong Dams “will create a cash windfall that will open the doors to rapid development,” *International Rivers* observed that: “revenue does not automatically lead to economic progress.”<sup>7</sup> Instead:

Much of the revenue will disappear as it travels from the dams to the Lao people. Laos lacks the institutions and capacity needed to manage the revenue effectively, and its government suffers from rampant corruption. Laos lacks a strong civil society and media to independently monitor how the money is spent. The Lao government has provided little information on how it intends to spend the revenue to improve people’s lives. As with past hydropower projects in Laos, it is unlikely that the poorest Lao citizens living near the dams will see the benefits

Further, whereas “energy security and economic development are legitimate goals”, as David Roberts writes, the dams generally have been:

conceived with little regard for their environmental consequences and socioeconomic repercussions. The proposed dams will prevent sediment from the upper stretches of the Mekong River from reaching its delta, depriving rice fields in lower Vietnam of essential nutrients. They will also disrupt the migratory patterns of fish, which will endanger the stocks on which Cambodians, especially, rely for much of their protein intake

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<sup>5</sup> David Roberts. 2014, September 3. No More Dams on the Mekong. *The New York Times*. [http://www.nytimes.com/2014/09/04/opinion/no-more-dams-on-the-mekong.html?\\_r=0](http://www.nytimes.com/2014/09/04/opinion/no-more-dams-on-the-mekong.html?_r=0). (Accessed 24 March 2015).

<sup>6</sup> Jared Ferrie. 2010, July 2. Laos Turns to Hydropower to Be ‘Asia’s Battery.’ *The Christian Science Monitor*. <http://www.csmonitor.com/World/Asia-Pacific/2010/0702/Laos-turns-to-hydropower-to-be-Asia-s-battery>. (Accessed 24 March 2015).

<sup>7</sup> Tiếng Việt. 2013, March 28. The Lower Mekong Factsheet Text. <http://www.internationalrivers.org/resources/the-lower-mekong-dams-factsheet-text-7908>. (Accessed 24 March 2015).

Clearly, Mekong dams are profoundly ambivalent and controversial sites. They thrive on promises of energy wealth, but *whose* wealth is disputed. They promise to bring metaphorical and electrical light to villages presently submerged in darkness, thus conjuring a particular public, yet there is little clarity about the costs of this illumination. Not least, their cumulative effect on innumerable plants, fish and animals, from upstream Lancang to the southern delta is also unpredictable; though the prediction that there *will be* massive effects is fairly certain.

Environmental organizations like *International Rivers*, the *3S Rivers Network* and *WWF* stand together in opposition to these developments. Thus, Carl Middleton, the Mekong Program Coordinator with *International Rivers* has argued that: “Cambodia’s free flowing rivers and abundant natural resources are invaluable assets, the health of which are vital to the well-being of Cambodia’s rural population... Poorly conceived hydropower development could irreparably damage these resources and undermine Cambodia’s sustainable development.”<sup>8</sup>

That is the risk inherent in development projects such as the ones taking place in the Central Cardamom Protected Forest, and the Sambor Dam planned for the Mekong mainstream. Alongside the Don Sahong dam presently being built just on the Laotian side of the Laos-Cambodia border, the latter may accelerate the extinction of the threatened population of river dolphins (known as throughout South-east Asian as Irrawaddy dolphins) already looming on the horizon. Meanwhile *EarthRights International* also object to development plans of the Lower Sesan 2 dam, claiming not only that it has used coercion and intimidation against villagers to get them to agree with resettlement plans but also that it will reduce fish biomass by more than 9% across the entire Mekong river basin and Tonle Sap lake.<sup>9</sup>

### **“Then Who Will Do It For Cambodia?”**

In July 2014, the diplomat Sim Vireak, stationed with the Royal Cambodian Embassy

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<sup>8</sup> Foreningen for internasjonale vannstudier. nd. New Report Urges Better Energy Planning in Cambodia before Hydropower Dams are Developed. <http://www.fivas.org/sider/tekst.asp?side=192>. (Accessed 24 March 2015).

<sup>9</sup> Ame Trandem, Maureen Harris, Meach Mean and Ith Mathoura. 2015, January 12. Human Rights Concerns Over Hydropower Development in Cambodia Brought to the UN. <http://www.earthrights.org/media/human-rights-concerns-over-hydropower-development-cambodia-brought-un>. (Accessed 24 March 2015).

in Tokyo responded to the overwhelmingly negative attention drawn by Cambodian dam development.<sup>10</sup> Writing in *The Diplomat* that the two key negative issues appeared to be “overdependence on Chinese investment” and a “relatively disproportionate focus on the environmental impacts of hydroelectric power,” Vireak suggested that critics consider why Cambodia so inordinately relies on Chinese money. Japan, the biggest Cambodian donor, he noted, has not made hydroelectric investments since 1992 when they began providing ODA to the country. Effectively, he argued, Cambodia is driven into the arms of China by the reluctance of other countries to invest.

Vireak drew attention to previous “bitter experiences for the Japanese government,” such as the Indian Narmada dam, and the Indonesian Koto Panjang project. He ventured that it is fear of getting embroiled in similar controversies that has prompted the Japanese, as others, to stay away. Instead, he noted, the Japanese, Germans, Australians and French involve themselves in “less sensitive projects such as electricity transmission and distribution systems.”

However, he persisted, for there to be any electricity to distribute it must be generated somewhere. Presently, Cambodia relies on import of around 60% of its electricity, and prices are among the most expensive in the region. That situation is unsustainable, wrote Vireak, both in terms of national security and in terms of attracting international investors. The dilemma, as he described it, is that international companies locating their factories in Special Economic Zones suffer from the inflated price level and unstable supply of electricity, which thereby becomes a major bottleneck for getting more investors. In this situation, hydroelectric power generation holds significant Cambodian appeal not only due to its zero carbon footprint but also because of its cost effectiveness.

No matter the care taken in building such dams, wrote Vireak, environmental

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<sup>10</sup> Sim Vireak. 2014, July 30. Cambodia’s Hydroelectric Question: China Power and the Environment. *The Diplomat*. <http://thediplomat.com/2014/07/cambodias-hydroelectric-question-china-power-and-the-environment/>. (Accessed 24 March 2015).

and social impacts cannot altogether be avoided. Yet, hydroelectric power is presently more a ‘need’ than a ‘want’ for Cambodia; and paradoxically it is a need especially in light of the need to attract foreign investments from countries, like Japan, that refuse to get their own hands dirty. “If China does not do it,” he asked, “then who will do it for Cambodia?”

The deputy executive director of the Cambodian NGO Forum, Ngy San, has insisted that: “Cambodia has many choices for meeting our electricity needs including renewable and decentralized energy options that must be explored.”<sup>11</sup> Such alternative choices, however, received scant attention in Vireak’s formula, which depicted hydroelectric dams as the core component in an upgraded Cambodia electricity network. While recognizing that biofuels, wind and solar energy are an option for “small-scale generation,” he emphasized the instability and cost of these energy forms, due to which they are not particularly attractive to the government. Comparing the situation with experiences elsewhere, he wrote that: “Some advanced economies have been trying to introduce these alternative energies, but successes have been modest despite enormous investments.”<sup>12</sup>

One of the world’s leading advocates of renewable energy until his death in 2010, the German politician and outspoken solar energy activist Hermann Scheer wrote of his experiences with introducing the potentials of renewable energy to leading energy experts in Cambodia’s neighboring country, Vietnam. While they were all familiar with nuclear power, he reported, even in the new millennium their knowledge about renewable energy remained “at a level typical of the 1970s” (Scheer 2012: 60). Whether or not this is also the case for Cambodian officials in 2015, Sim Vireak certainly underestimated the inroads alternative energy sources have made in “advanced countries” such as Germany and Denmark which, contrary to Cambodia, do not have year round exposure to sunshine.

It is difficult to disagree with Scheer’s assertion that it is “paradoxical that renewable energy, with its minimal external effects, is more expensive on the energy

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<sup>11</sup> Foreningen for internasjonale vannstudier. nd. New Report Urges Better Energy Planning in Cambodia before Hydropower Dams are Developed. <http://www.fivas.org/sider/tekst.asp?side=192>. (Accessed 24 March 2015).

<sup>12</sup> Sim Vireak. 2014, July 30. Cambodia’s Hydroelectric Question: China Power and the Environment. *The Diplomat*. <http://thediplomat.com/2014/07/cambodias-hydroelectric-question-china-power-and-the-environment/>. (Accessed 24 March 2015).

markets than our conventional energies with their high social costs” (Scheer 2012: 75).<sup>13</sup> To resolve this paradox, Scheer argued for the necessity of completely overhauling modern energy infrastructures. Most generally, he was adamant that treating energy as a topic detached from broader social issues is an “intellectual illusion” (Jagger 2012: xii). The premise of Scheer’s envisioned radical transformation, which he referred to as “100% renewable now,” was thus the necessity of simultaneously democratizing and decentralizing energy systems (Jagger 2012: xiii). Further included that the social and environmental costs of different types of energy production would be redefined as embedded elements “in a social market economy” (Scheer 2012: 75).

As shown by the difficulties Scheer faced in promoting his vision, even at home in Germany, however, there are many obstacles to such a transition. They are not diminished once one travels to Southeast Asia.

For one thing, drastic changes to energy systems are made practically difficult by the materiality of existing infrastructures and the limited resources available. For another, as exemplified by Sim Vireak’s analysis, they are also impeded by the reliance on formulaic tropes and narratives about hydropower and solar energy’s respective economic and social consequences. Certainly, the practical feasibility of renewable energy on a grand scale in Cambodia presently looks bleak and *unrealistic*.

Yet, as Hermann Scheer wrote

If analysis of the current situation indicates that the limited opportunities to act do not provide an adequate answer to the real challenges we face, then we need a different understanding of realism, one aimed at changing the parallelogram of forces to increase the room for maneuver (Scheer 2012: 12)

Rather than lose courage when faced with an apparently insurmountable *wall of reality* – in Cambodia taking the material shape of massive dams – Scheer thus insisted that such situations required a *redefinition of realism* that would make climbing the wall feasible. Writing that “the problem is not what is ‘real’ and what is

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<sup>13</sup> Joseph Masco (this volume) recalls that at the end of Jimmy Carter’s presidency in 1980, “the U.S. national laboratory system was spending over fifty percent of its funds on alternative energy research.” Carter also installed solar panels on the White House, which were promptly removed by Ronald Reagan. Even at this center of power, alternative energy histories have previously been in the making.

not”, but rather what occurs, and what can be *made to occur*, Feyerabend (2001: 10) would concur.

To create an appetite for what can be made to occur, it is necessary to search for Feyerabend’s *surprises* within general patterns and to tease out Scheer’s *room for maneuver* at the margins of established energy landscapes.

### **Emergent Patterns**

Cambodian politicians and diplomats repeat the well-worn argument that solar energy is unsustainable, at best a small supplement to the electricity gains they hope to make via large-scale infrastructure projects. Yet, while the diplomat Sim Vireak looked abroad and found only modest success in spite of enormous investments, Scheer highlighted significant accomplishments in Germany and Northern Europe.

While Scheer was not speaking about the dangers of cascading dams for the Mekong delta, but rather about those of the fossil economy for the global climate, his general conclusion is relevant:

The apologists of the fossil global economy justify their failure to make even half-hearted progress along this road with an equally tired fossil of an argument: in a world of global competition, the ‘luxury’ of concern for the environment must be earned through further conventional economic growth. This economic philosophy is in reality a necrosophy – the wisdom of death (2004: 138).

In critiquing this “necrosophy,” Scheer found enormous potential in solar energy, which he argued would quickly be able to out-compete conventional energy sources. Present achievements were only more impressive, he insisted, given that they had barely been subsidized, and had happened despite violent opposition from the established energy industry, including most politicians.

In 1970, Buckminster Fuller posited minituarization as a general law of technology. “All the technical curves rise in tonnage and volumetric size to reach a giant peak,” Fuller wrote, “after which minituarization sets in. After that a more economic art takes over which also goes through the same cycle of doing progressively more with less” (Fuller 1970: 73). Four decades later Scheer drew much the same conclusion, offering a formulation that might well have been about

Cambodian energy politics: “we only take large seriously – a *large* project, a *large* power-plant – rather than the many small initiatives, even if their joint effect is greater” (2012: 82). Yet, he continued, when it comes to energy, small is profitable (Scheer 2012: 106, referencing Lovins 2002). Although the potentials remain vastly underestimated, a “whole spectrum of new possibilities for generating electricity [is] being opened up by photovoltaics” (Scheer 2012: 105).

From this point of view, the question is not whether but *how* existing, massive, centralized energy infrastructures can be dismantled, not whether but *how* new energy infrastructures can be shaped. Following the sociologist Oscar Negt, Scheer (2012: 110) described this as a matter of “‘sociological fantasy and learning from example’: An increasing number of ‘best practice’ examples develop into a widespread social movement.”

Although they do not presently add up to much, one can find quite a few small-scale renewable energy initiatives in Cambodia. Since 2009, the *Energy and Environment Partnership with the Mekong region*, funded by the *Nordic Development Fund* and the Finnish Ministry of Foreign Affairs, has funded 39 pilot projects. Choosing projects that hold promise to “catalyze further public and private financing in renewable energy and energy efficiency investments in the region,”<sup>14</sup> the partnership has supported pilots on topics like “Solar Powered Drinking Power in Kampot Province” and the making of an “Energy Self-Sufficiency Village.”<sup>15</sup> Taking another route, some small projects have been funded by charity fundraising websites like *GlobalGiving*.<sup>16</sup> In conjunction, they illustrate an endeavor to create “a new energy mix” (Agustoni and Maretta 2012: 400).

For Alfredo Agustoni and Mara Maretta such new mixes promise not only to impact “society in terms of lifestyles and consumption patterns,” but potentially to introduce “new balances in the democratic system” (400). Given the stronghold of the *Cambodian People’s Party* on the Cambodian political system, it stretches the imagination to think that renewable pilot projects like the ones just mention will add

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<sup>14</sup> Energy and Environment Partnership with the Mekong Region. nd. EEP Mekong at a Glance. [http://www.eepmekong.org/about\\_us/eep\\_overview.php?reload](http://www.eepmekong.org/about_us/eep_overview.php?reload). (Accessed 6 May 2015).

<sup>15</sup> *ibid.*

<sup>16</sup> GlobalGiving. nd. Renewable Energy for 15 Rural Cambodian Families. <https://www.globalgiving.org/projects/biogas-renewable-energy-for-15-rural-cambodian-families/updates/?subid=18418>. (Accessed 6 May 2015).

up to any general “re-balancing,” however desirable it would be. They can nevertheless be seen as ontological experiments with future infrastructures *in miniature*.

At this point, we can return to Paul Feyerabend’s (2001: 169) argument that there is an illusory quality to experiments with new configurations of reality, precisely because they have not yet solidified into a stable pattern -- like a durable infrastructure. Yet, it is *also* due to this very ‘illusory’ quality, that experiments, like solar pilot projects, can operate as test-sites for alternative energy futures (Jensen 2010: 31-51; Jensen and Winthereik 2015). In the aggregate, they may eventually gather force to push existing energy infrastructures into new configurations.

That possibility, which is, of course, far from a *certainty*, gains a modicum of plausibility once it is recognized that it is not only NGOs and well-intentioned Western crowd-funders that find potentials in Cambodian sunlight. Rather, a growing number of solar energy companies, like Star8, with which I began this chapter, are trying to raise the bar of expectations.

Writing for *altenergymag.com*, *NRG Solutions* point out that “As Cambodia is located in one of the sunniest areas of the world, solar power provides an excellent solution to the reduction in kerosene use: it's safe; reliable; and easy to use.”<sup>17</sup> Repeating the observation that only 25% percent of the Cambodian population is connected to the centralized grid, leaving more than 10 million of people in the countryside without regular access to electricity, the article depicts a strategy that centers on “building networks of entrepreneurs,” extending “their reach deeper into the remote rural areas where solar can make the most difference.” Thus, for example, *NRG Solutions* aims to establish a solar distribution network in Kampong Thom Province that, in connection with a local micro-finance institution, will offer: “custom designed ‘Solar-Loan’ products,” via a “‘Solar Shop’ which will act as the management hub and will host training, stock, awareness raising, and the all-important service technicians.” Contrary to export-oriented companies like Star8, *NRG Solutions* is at least thinking about how to reach the elusive rural end user (cf.

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<sup>17</sup> *NRG Solutions*. 2013, November 15. Empowering Cambodia with Solar Lighting. *Altenergymag.com*. [http://www.altenergymag.com/content.php?post\\_type=2173](http://www.altenergymag.com/content.php?post_type=2173). (Accessed 6 May 2015).



Wilhite 2013: 61). As I continue to discuss, however, Star8, too, seems up to more than simply extracting cheap labor.

### **Here Comes the Sun?**

I began this chapter by describing a conversation with manager of Star8, stopping at the very moment it dawned upon me that most of the company's solar products were unlikely to be for local consumption. Similar to its neighboring garment factories, the main attraction of Cambodia seemed to be its low wages and unregulated working conditions. Let me now pick up where I left this story.

Trying to get a better sense of the situation, I press on: "who do you think will be the buyers of the solar panels for housing?" Not at all evasive, the manager answers that it makes most sense for factories to acquire them, but there might also be a market for wealthy households. The plot thickens. Certainly, Star8's strategies are very different from the visions of local empowerment that propel NRG Solutions or the Energy and Environment Partnership. Yet, just at the point where I am ready to conclude that this is indeed nothing but exploitation in yet a new guise, the manager begins telling me about efforts to lobby the minister of the environment.

In his mid-thirties, His Excellency Say Samal is the youngest of the Cambodian ministers. Having lived in Melbourne for a decade, gone to high school, and received his university degree there, the minister is often seen to exemplify a new generation of politicians. Star8 talks to him because he "has a somewhat broader view," which is especially important since "there are many layers in Cambodian ministries and politics."

One aspect of this lobbying focuses on the use of buses in Phnom Penh and Siem Reap, home of the Angkor Wat temples, as showcases for the potentials of Cambodian solar energy. Reaching a point where this could be considered even a possibility has been a battle. As the manager explains: "Most of them knew nothing about solar power. I was asked by officials what would happen at night when the sun isn't shining. It was so dumb."<sup>18</sup>

Another dimension of lobbying, described by the manager as simultaneously

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<sup>18</sup> Storage of solar and wind energy is indeed a central problem for scaling up the use of these forms of renewable energy, and much effort goes into technical innovation and improvement. At present, solar energy generated off-grid is usually stored in a local battery bank.

strategic and educational, has to do with convincing government officials that solar energy is a supplement, rather than a threat, to their existing plans for national energy development. Presently, Cambodia imports more than 60% of its energy, so an addition of solar energy to the national grid would hardly *steal* anything from the Chinese dams. Slowly, I am told, the message that “whatever is generated by solar energy is in addition to the Cambodian grid” is starting to be understood. Officials are beginning to get that “it is simply electricity the country won’t need to pay Thailand and Vietnam for.”

I pursue the question of Star8’s vision for Cambodian solar energy development over the next decade. The manager responds that he hopes Southeast Asian countries in general will become frontrunners of renewable energy. Just this moment, he is on the way to the Manila office where things are quickly moving in that direction, after the Philippine government placed a huge order for solar lighting and transportation.

“When this becomes a success,” (there is no “if”) the manager says – as he throws on his jacket and hurries out the door -- “we will be able to say: see, they did it, and look how well it works: no pollution, no problems, and it doesn’t take forever like building a dam!”

After the abrupt ending to my interview, the Hungarian guide takes me on a tour of the facilities, narrating the solar possibilities imagined by the company as we go. He proudly explains that the whole building is off-grid and generates more electricity than it needs, so the surplus is sold to the nearby electricity plant. However, off-grid electricity production and use is basic to all Star8 products. Tapping into naturally available sunshine, these products allow people to tap into *them*, feeding energy to devices or keeping it stored for later use.

In the main hall, dozens of solar vehicles are on display. There are solar powered buses in various sizes, including those that might soon drive the roads of Phnom Penh and Siem Reap. There are solar tuk-tuks, which, at a cost of \$2600-2800, are only a few hundred dollars more expensive than regular gasoline powered ones. There is also a solar powered moto with panels crammed onto every conceivable space. The hope is that these product-lines will begin to take off, especially following the Philippine government order. But electric tuk-tuks and motos have a bright future not only in Southeast Asia, but everywhere where sun is abundant: South Asia,

Africa, Central America. Certainly, this is a future that also seems to hold some commercial appeal. Coming in many shapes and colors, the vehicles are covered by Maggi, Nestle and Coca Cola logos.

At the end of the tour, we go to the parking lot. Proudly showing a truck plugged in to collect energy from solar-panels on the roof, the guide turns around and points to a small walkway in front of the main building. It, too, is made entirely of solar panels. “Step on it,” he says, “see, it’s very strong.”

“You know what our big plan is?” he asks. “We want to put these panels all along the road between Phnom Penh and Sihanoukville.” That’s a 220-kilometer stretch. Smiling broadly, he continues: “The road itself would generate electricity enough for all the villages along the way and for half of Phnom Penh! An amazing thought.”

“I first came here in 1993,” the guide goes on, “I have lived in Phnom Penh for 18 years; this is the place for me. I have only worked for Star8 for two months. But this is special. It is big. I love working here, because this is the future.”

### **Experimenting with Cambodian Energy Infrastructures**

As noted, scholars have pointed to a fundamental discrepancy between centralized and decentralized energy systems. Thus, Hermann Scheer wrote that: “the transition to renewable energy is also inevitably a conflict between two energy systems” (2012: 48) and John Urry (2014: 4, see also Wittfogel 1957), linked centralized energy systems and despotism. In the Cambodian context, where the fragility and centralization of both democracy and electricity are comparable, the diagnosis seems apt. Despite the attempts of NGOs and companies like Star8, government interest in solar energy is presently limited and a market barely exists. In the formula for national development hydropower dams is seen to be the key, or only, variable.

In this context, Feyerabend’s (2001: xi) “ontological consideration” that “worldviews interact with Being in a mutually creating fashion” is important, since it entails that “we do affect and shape ‘reality’.” As Feyerabend’s emphasis on “mutual creation” makes clear, this is not an argument for any rarefied kind of social construction, as if the materiality of water, sun or cement could be ignored. Indeed, Feyerabend made explicit his keen attention to material effects by pointing to many “situations that endanger human life and that have to be dealt with.” Yet he insisted that such situations are the more dangerous precisely because people tend to rely on

imaginations that “‘block off’ what disturbs them” (2001: 4). In the context of Cambodian energy infrastructures, such ‘blockage’ takes the form of formulaic rejections of renewable energy, not to mention of the environmental and social threats of cascading dams, in the name of short term economic and security interests.

Even as I have tried to elucidate the capture of energy imaginations by this rigid formula, the central ambition of the chapter has not been critical. Instead, I have suggested that, if one hopes to create a chance for the emergence of alternative energy infrastructures amidst these grim realities, taking “an experimental attitude towards reality” (de Landa 1998: 273) may be necessary. Thus, I have aimed to “destratify” (274) Cambodian energy reality as *it is*, in order to strengthen the capacity of sunlight for entering collective imagination and practice, opening up to what *could be*.

At this point, we can return one final time to the many-colored solar building of Star8. On the one hand, it is manifest that the success of the company depends on access to cheap labor in Cambodia and elsewhere, and on export of its high-end products. On the other hand, however, Star8 also depends on promoting an image of Cambodia as a test-site, which would testify to the transformative potentials of solar energy. Working in this direction, Star8 could be characterized as aiming to prove wrong in practice what Hermann Scheer referred to as “the spurious argument that no one benefits when one country forges ahead” (2012: 50).

Among other things, this would depend on the slim possibility of getting actual solar buses and motos on the streets of Phnom Penh and Siem Reap. Even if the company obviously acts with a view to securing its own market position, it might thus be seen as *also* trying to create a room for maneuver for the making of alternative Cambodian energy futures. Rather than cynically exploitative, it could even be described as idealistic, if not naive. At the same time, my pointing to this interpretive possibility may suggest to skeptical readers that the same terms also apply to the present argument.

As I see it, however, there is no single answer to the question of whether Star8 is cynical, naïve, or both. I also do not think that determining the company’s motives is the most pressing ethnographic task. For after all, as Shaylih Muehlmann (this volume) notes, infrastructures that are “ostensibly built for one purpose, can be used for a secondary purpose.” What matters, given the infrastructural propensity to ‘double,’ if not multiply, is finding within existing patterns the room for maneuver

that makes future repurposing possible.

Such repurposing might be seen as part of the functionalist thinking critically examined by Andrea Ballestero (this volume). Yet the ease with which we can critique functionalist thinking does not subtract from the fact that infrastructures are only built in the first place because they are imagined to serve functions. Rather than rejecting function, I would emphasize that they are infrastructurally variable and historically emergent. We do not yet know what the ‘functions’ of solar energy will turn out to be, either for Star8, for the Cambodian ministry of environment, for Phnom Penh tuk-tuk drivers, or for the rural population, since they will be the outcome of current infrastructural experiments.

Such, at least, has been the experimental gambit of this chapter, which has aimed to cultivate a response and disposition to solar energy futures that is equidistant from hype and critique. Such cultivation, I have suggested, is a matter of whetting an appetite for non-probable, but not impossible, solar futures, giving them the chance, at least, to inhabit us, to become “preferred ways of relating to the world and to ourselves” (Despret 2004: 58).

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