

# Energy Transitions:

Lighting in Vanuatu



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## **Introduction**

*Lighting Vanuatu* began in 2010 as a two-year project funded through The Australian Aid - Governance for Growth Programme. The primary objective of the project was to increase access of portable solar lanterns for rural Vanuatu communities in an effort to reduce their dependency on kerosene as the primary source of household lighting. To achieve this goal the project offered a supply-side subsidy for two Vanuatu NGOs (ACTIV and VANREPA) to support the distribution of 24, 000 solar lamps mainly to rural areas. The subsidy was aimed at improving bulk purchasing power by the NGO's in an effort to reduce the price of the imported solar lights at the household level.

The analysis of the Independent Completion Review (ICR), Business Case Study (Annex 1), and the Survey Data Overview (Annex 3) indicate that the *Lighting Vanuatu* project has been successful in enabling the uptake and awareness of portable solar lighting products. These reports highlight that the transition from kerosene lamps to solar throughout the islands of Vanuatu was both clear and ubiquitous. When framed at this descriptive level, the project certainly presents a good news story for renewable energy.

The rapid transformation from a non-renewable to a renewable source of lighting within a 2 to 3 year period runs counter to many of the discussions in developed countries who struggle to disrupt the locked-in energy systems that sustain and maintain a reliance on fossil fuels. Considered alongside the slow and politically infused renewable energy debates in the developed country context, Vanuatu's rapid adoption of portable solar lighting is precisely the kind of transitional story that many communities could only dream of achieving. However, the successful or unsuccessful acquisition and diffusion of a particular piece of technology – portable solar lamps – is only part of the story.

The initial aim of the Independent Completion Review (ICR) was to identify the degree of adoption and contribution made by *Lighting Vanuatu*, any geographic, social or cultural trends evident in adoption patterns, any economic or social benefits, specific changes in the lighting technology used by households, changes in household practices associated with any shift in technology, and changes in householders' perceived needs and aspirations with

regard to lighting. While this descriptive analysis is essential for evaluating the success of the programme within its own terms (i.e. the ICR), the broader cultural, economic and political implications of this technological diffusion have yet to be addressed. The purpose of Annex 2, therefore, is to develop the *Lighting Vanuatu* story further by offering a more nuanced interpretation of the transition from kerosene to portable solar lights in rural Vanuatu communities; our emphasis and focus is different to that of the ICR, but complements and enhances the understanding of Lighting Vanuatu as an aid project.

We begin by outlining the methodology used to gather and interpret the information that informs this report. We then draw on the Energy Cultures Framework (Stephenson et al., 2010) as an organising structure for describing Vanuatu's prevailing energy culture. Next, we address four key debates to emerge from the fieldwork with the hope of encouraging a reflection on the shifting social norms and practices (economic and political) that are also 'diffused' with the introduction of a new piece of material culture like the portable solar lamps. The annex concludes with a comment on the implications of this analysis for future energy-related development projects in Vanuatu.

## **Methodology**

The overall approach to this research is qualitative in nature as we wanted to explore the meanings that people attributed to the lights and the impacts that they had on everyday life. Interviews were conducted during a two-week period in Vanuatu with a variety of stakeholders in the Lighting Vanuatu project. The analysis was largely interpretative, beginning by using the Energy Cultures framework to make sense of the technology transition and then developing and discussing a number of the key findings from the initial analysis using some thinking from poststructural theory.

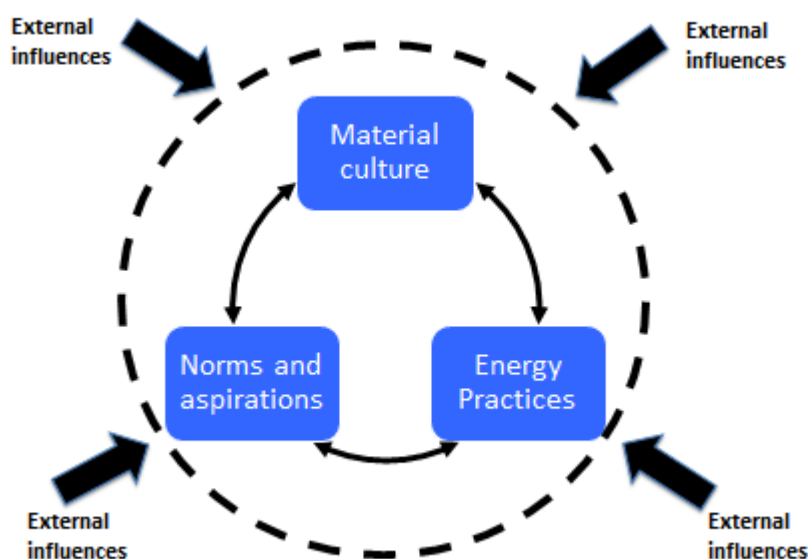
### **Energy Cultures as a framework for understanding energy transitions**

Transitions in energy cultures are a complex processes, combining a multitude of factors that coalesce to shape individual, group, and community energy practices. Such transitions have been studied from a number of perspectives, including (but not limited to) microeconomics, behavioural economics, technology adoption, social and environmental psychology, and sociology. However, each of these perspectives offers only a partial insight into the complex landscape of energy transitioning. The Energy Cultures Framework (see Stephenson et al., 2010 for more information) provides a broad model that is "inclusive of the many perspectives of ... transitions" and enables "greater exploration and debate of this complexity" (Stephenson et al., 2014).

At its core the Energy Cultures Framework is deceptively simple, providing a structure to help identify the key factors involved in human behaviour and behaviour change; the framework outlines energy behaviour as a result of the interactions between material culture (i.e. energy related technologies, physical infrastructure, etc.), energy practices (i.e. how people, groups and communities interact with their material culture), and norms and aspirations (i.e. the beliefs and understandings that may underpin material culture and energy practices). For example, having a kerosene lamp (material culture) will “force” a particular set of energy practices (e.g., regular purchase of kerosene, lighting lamps at a

certain time, etc.) and around these will sit a set of norms (i.e. expectations of “how we do things round here”).

Additionally, as shown in Figure 1, these three elements exist and interact within a particular context, comprising a complex mix of external influences, which may impact and affect each of these aspects. This includes factors such as the availability of different lighting technologies, the pricing of kerosene, the amount of disposable income available to households, and so on. Each of these may impact on the elements of the Energy Cultures framework, for example, the availability of different lighting technologies will affect the context in which purchase decisions are made, and may therefore impact upon the material culture of the households within a community (i.e. the mix of lighting technologies owned and used by that community).



**Figure 1: Energy Cultures Framework**

As well as offering an insight into the complexity of energy transitions over different scales (individual, group, community, etc.) and accounting for context and heterogeneity, the Energy Cultures framework can act as an organising framework for research, assisting researchers to take a holistic perspective of research space when designing methodologies or



structuring analyses. Integrating the Energy Cultures Framework into this work thus ensures that the design of research questions and subsequent evaluation of data accounts for each integrated element of energy behaviour and energy transitions.

## **Methods**

To evaluate the effectiveness, efficiency and community implications of the *Lighting Vanuatu* project, the research combined interviews with stakeholders in the distribution chain, survey data from beneficiary households in multiple communities distributed across Vanuatu, and semi-structured interviews and observational field-notes with a subset of beneficiary households and communities.

The design, implementation, and initial evaluation of the survey is described in more detail in Annex 3. Insights from this work was used alongside the Energy Cultures framework to help design the interview questions and provide a structure to help identify the key factors involved in the adoption and use of pico-solar lighting, and the subsequent shifts in energy related behaviours. This resulted in the interviews with beneficiary households and communities following a four-staged approach:

1. Contextual information was sought to gain an understanding of the participants and their general patterns of everyday life.
2. Questions were asked to get an insight into the material culture around lighting technologies owned and used by the households, and the extent to which a technological shift in lighting solutions has been cultivated. These included issues surrounding the decision to purchase (or not) solar lights, such as where they heard about the lights, knew anyone else using solar, and what the key economic differences were found to be.
3. These questions aimed to elicit a fuller understanding of how any shift in technology has impacted family practices and daily life, especially around energy related practices in the home; where and when are the lights used, how has this varied between the old lighting technology and the new, how are the lights recharged.

4. Questions aiming to probe shifts in norms and aspirations around lighting and other solar technologies (e.g. photovoltaic panels) were asked to understand how communities may want to use solar technologies in the future. Has their experience to date affected their appetite for more solar lamps, or for bigger systems capable of delivering power?

The household interviews were carried out in Bislama (the local language) with translators or enumerators initially dealing directly with villagers and noting responses to the questions pre-developed. However, after only a handful of interviews and listening intently we were able to pick up the language and work with the enumerators to conduct the interviews in a more semi-structured manner. This was not the case for every interview but for the vast majority we were able to have a role in the generation of the data.

Distribution chain interviews were held with the NGOs involved in the project and other private renewable energy businesses. The interviews were tape recorded and transcribed word for word. Observational field-notes were generated from visiting trader stores and any other businesses/shops selling solar lights. Further to these interviews other stakeholders were interviewed as part of the process to understand the implications of the project. For example, interviews were held with representatives from the World Bank, NZ Aid and Telecom Vanuatu Ltd. These interviews, while not directly used in the generation of themes and discussion in this annex are nevertheless part of the research that all contributed to the arguments constructed.

A significant part of the research in the field was what could be termed ‘ethnographic’ meaning that it involved immersion by observation and participation in the cultural field of investigation (Fetterman, 1989; Geertz, 1973). We use the term ethnography to depict a method that Geertz, borrowed from Ryle, has famously termed “thick description” (Geertz, 1973: 6) meaning that data in ethnographic method involves descriptions of complex human interactions in complex contexts and these are examined as part of the field research. It is ‘thick’ in terms of being densely rich data. While we use an ethnographic method we have not adopted a traditional ethnographic realist position in this research, i.e. a search for an

objective reality or a “passive contemplation of existence” (Rabinow & Sullivan, 1979: 20). Rather, we adopted an approach of acknowledging multiple subjectivities and meanings (Kondo, 1990). Our research journey included key aspects described by Fetterman (1989) as culture, holistic perspective, contextualisation, multiple realities, non-judgemental orientation, symbol & ritual.

Field notes were made at the time of immersion. Each researcher made notes during interviews and focus groups then after each village and each evening. In addition we all kept individual diaries that capture our individual thoughts, feelings and experiences. All the data was shared at the conclusion of the field work. Field notes consisted of “accounts describing experiences and observations the researcher has made while participating in an intense and involved manner” (Emerson, Fretz & Shaw, 1995: 5) and are an important part of the ethnographic research journey. The notes aimed to be reflective on participant voice, physical environs, behaviours and our own thoughts, which were sometimes challenged through the experiences we had.

### **Analysis**

A thematic analysis was applied to the information collected from the beneficiary household and community interviews to draw out the significant themes and codes from the data. The interpretation of these themes, and the fieldwork in general, were sensitised by the Energy Cultures framework. This provided a holistic perspective into our investigation of energy behaviour and energy transitions, incorporating the integrated elements of material culture, energy practices, norms and aspirations, and contextual information. The analysis was designed to provide a rich description of the changes in household and community practices associated with the new lighting technology.

Additionally, a contextual analysis of the data examining not only what participants said but also what enabled them to make particular statements in particular ways (i.e. why some statements were constructed in a certain way and understood in a common-sense manner) enabled further exploration of the energy transition (Foucault, 2002 [1972]). Although this approach may seem to be just about words and language, it allowed us to explore meanings

that may otherwise be taken for granted (see for example Laclau & Mouffe, 2001). The use of poststructural theory to make sense of certain phenomena disrupts an acceptance of meaning as common sense, and is the approach we have drawn upon in this research.

## **Vanuatu's Prevailing Energy Culture**

Before evaluating the impact of the *Lighting Vanuatu* project in terms of the cultural, economic and political implications, it is first necessary to understand the prevailing energy culture, particularly with regard to lighting, within communities in Vanuatu. This section is intended to help set the scene and situate our findings.

Vanuatu is comprised of 83 islands supporting a population of approximately 250,000 people, of which fewer than 30% are connected to an electrical power grid. This infrastructure is limited to areas of Port Vila and Luganville, and whilst some rural communities do have access to generators they are generally found to be expensive to run and are not used frequently.

The lifestyle in rural Vanuatu tends to be an outdoors one; many people live in homes that have 2 or 3 rooms, as well as separate area for food preparation and another for washing that is often not connected to the main building. There are also toilets that may be shared with other families and are separated a short walk from the main buildings. In addition, there is a social element within most rural communities, with each village having a traditional meeting place used for community gatherings and ceremonies. Many also have *nakamal*, where men (and sometimes women) can congregate for the preparation and drinking of kava. As the sun sets relatively early throughout the year (5:20pm in winter and 6:20pm in summer) this means that people are frequently eating dinner, engaged in social activities, or moving around between different parts of their home or between their homes and other buildings in the village, after dark.

### **Material Culture**

As a consequence of the lack of electricity access in rural Vanuatu, combined with the early hour of sunset through the year, portable lighting has played a role within these communities for some time. In an 18-month ethnography conducted nearly 15 years ago,

New Zealand Anthropologist James Patrick Taylor (2008) describes the use of portable lamps:

Houses with corrugated iron mixed with those of more familiar concrete blocks, some emitting the glow of an electric light or more softly-toned hurricane lamps. People were out walking, on their way home from work or off to drink kava at one of the many *nakamal* (kava bars) whose proprietors had hung out kerosene lamps, signalling that their kava was ready (p. 21, emphasis added).

As indicated by Taylor, the prevailing lighting technology used in rural Vanuatu has been kerosene lamps; in 1996 over 90% of the population used kerosene as their main form of lighting, and even as recently as 2010, one year into the Lighting Vanuatu program, approximately 50% of the population still relied on this fuel source.

However, since Taylor's observations Vanuatu's energy culture has observably changed. Although electricity remains the dominant source of lighting in Port Vila, the visual presence of solar lights has replaced the softly-toned kerosene lamps. In cities, portable solar lamps hold a ubiquitous and prominent space in the window displays of many retail shops. A visual stocktake of shops in Port Vila and Luganville confirm that nearly every Chinese shop and most daily good stores prominently display portable solar lighting products, highlighting their popularity and demand in the retail space. Portable solar lamps are even more prominent in rural villages where they are readily visible, found either hanging on their houses or placed on grassy clearings to gather the sun's rays. And often the lights that now beckon customers to the kava bars are solar, not kerosene (Figure 2). In fact, where kerosene lamps were found, they were often abandoned and broken (Figure 3).



**Figure 2: Solar lamp signalling customers outside a *nakamal*, Efate.**



**Figure 3: ‘Antique’ kerosene lamps**

## **Energy Practices**

There have been some shifts in energy practices that have gone hand in hand with the change of technology. Solar lamps are better suited than the kerosene lamps for mobile or outdoors use; they are brighter, they do not have a flame that could blow out, there is no danger of causing fire, they do not generate heat, and they are safer to carry around. This has had an impact on the purposes for which the lights are used, levels of social interaction, and on which members of the household are able to use the lights.

As outlined in the ICR, with the change in lighting technology there has also been increased opportunity for social interactions with the lights being used for village and inter-village functions. Women are also taking advantage of the new technology, and using the solar lights to facilitate social working groups (e.g., mat weaving) in the evenings. The light are also able to be used more in outdoor and mobile settings; people can use them when walking and travelling between community spaces and their homes, or when they visit the bathroom or toilet after dark.

In addition, children are able to comfortably use solar lights, whereas they were not able to use kerosene lights in this way due to the potential dangers of a naked flame, thus changing generational practices and influencing norms around energy use.

## **Norms and Aspirations**

There is no doubt that the technological shift to solar has resulted in shifting norms and aspirations around both lighting use and solar more generally. When travelling around villages in rural Vanuatu there is much evidence of the presence of solar lamps, particularly as they are left charging outside homes during the day clearly visible for all to see.





**Figure 4: Lamps being charged in villages and clearly visible from public space**

Almost everyone consulted during the ICR spoke of the desire to have more solar lamps, and the aversion to the use of kerosene. Despite the prevalence of kerosene just 3 years ago, the displeasure expressed at the thought of returning to this technology indicates the clear changes in norms and aspirations bubbling away.

Whilst this overview of the prevailing Energy Culture in Vanuatu helps to set the scene and situate some of the initial findings, it also raises further questions around the factors governing this rapid uptake and the social, cultural and political implications of this new technology.

## **Vanuatu's Transitional Energy Cultures: Key debates**

Sensitised by the Energy Cultures framework (Stephenson et al, 2010), the aim of this section is to begin (re)considering 'technology' paying particular attention to the relationships between material culture, energy practices, and social norms. This broader understanding of 'technology' involves an intentional play on words in order to reinforce the idea that any shift in material culture is always accompanied by a transformation of social norms as well practices. Inspired by philosopher Michel Foucault, we consider 'technology',

to refer not to tools, machines, or the application of science to industrial production, but rather to methods and procedures for governing human beings... It refers to the ways in which modern social and political systems control, supervise, and manipulate populations as well as individuals (Behrent 2013: 55).

The excerpt above highlights one the underpinning assumptions of the Energy Cultures Framework, namely, technological solutions alone cannot inspire the kind of transformation of social relations needed for wide reaching sustainable transitions to occur. 'Sustainability' – be it social, environmental, or economic or a combination of all - is tied to whole systems of which technological consumer products are a part. More than just material culture, 'technology' is therefore employed here to refer not only to the acquisition of new things, but more radically incorporates how material goods are deployed in practice and normalised in everyday lives at a range of scales (communities, national governments, NGOs and individuals).

This section strives to open a debate on the shifting social norms and practices (economic and political) that are also 'diffused' with the introduction of portable solar lamps through the *Lighting Vanuatu* project. In doing so, we seek to help redefine 'technology' within the international development context. No longer will 'technology' only refer to the diffusion or acquisition of material culture, but the 'technology' of the entire *energy culture* (material

culture, norms and practices). As such, sustainability and social equality are only ever possible if all the ‘technical’ elements of an energy culture are inclined that way.

With this theoretical position in mind, the discussion below seeks to extend the initial ICR by asking:

1. How has the technological shift from *Lighting Vanuatu* project been enabled? What are the (socio-political) conditions that have made the shift possible?
2. How can the Energy Cultures framework help to make sense of the impacts arising from the shift in lighting technology?

These questions are addressed through a discussion of four key debates that emerged from this research: (1) ‘easy’ as a outcome? (2) solar expectations and aspirations, (3) negotiating cash, subsistence and political economies, and (4) circulating practices of Ni-Vanuatu communities.

### ***1. Isi nomo: ‘Easy’ as an outcome?***

It quickly became apparent that one of the primary themes of the *Lighting Vanuatu* project was that having a portable solar lamp simply made life a little easier. In meetings during the mission it became apparent that despite outcomes of gender equality, improved education, financial savings, and community building, many participants in the *Lighting Vanuatu* review kept reiterating the same general benefit of the portable solar lights: “*Isi nomo*” or “They’re just easy.” From an energy transition point of view this is a useful finding – it shows that if the technology is easy to use and makes life easier then a rapid uptake can be enabled. However, this raises several questions when looking at this theme from the position as a development/aid project. Namely, does supporting and promoting an ‘easy’ life through the consumer purchase of a new technology amount to an appropriate developmental goal? Is it enough to strive to make life a little bit easier or what else is expected now that this part of life is easier?

The idea that the solar lights simply made everyday life a little bit “easier” was heard consistently across all the villages visited. The following sub-themes (re)present the ways in

which villagers discussed the convenience of the lights and the ways in which they made their lives ‘easy.’

*‘Easy’ in the everyday*

The most prominent discussion across the interviews and focus groups was how the solar lights made everyday life easier. The patterns of use and stories told varied little between villages, and examples discussed by participants include:

- Mothers getting up during the night for babies or sick children find it much easier to turn on the solar light than light a candle.
- Some of the older members of the community mentioned that it made it easier to go to the toilet at night.
- Other tasks such as fetching water, kava preparation, weaving mats, sewing dresses, doing homework, conducting meetings (often there would be a number of lights at a meeting), fishing at night, and going to church at night were also made easier.
- In a focus group in Laukatai it was mentioned that there was no more collecting firewood, no lighter required, and no kerosene needed, which made the everyday lighting of the household easier.

*Easy because the lights are not complicated technology*

Solar lamps required little education to use; as one participant mentioned, “Just press the button!” The word ‘easy’ was never associated with solar panels and observational evidence suggests that the level of involvement here was anything but easy. However, the concept of easy was associated with other technology such as mobile phones as the following illustrates:



**Figure 5: Telecom Vanuatu Limited’s (TVL) “Making mobile easy” campaign, Port Vila Bauerfield domestic Airport**

This campaign attempts to de-mystify the concept of a mobile phone to encourage uptake of this technology. For many people (Ni Vanuatu and globally too) mobile phones themselves and the wider technologies with the phone i.e. the call plans, top ups, texting etc. may be off-putting for purchase. Therefore the technologies (methods around the technology) and the piece of technology itself (material culture) have to be easy to adopt for uptake to occur. The same happened with the solar lights – participants told stories of seeing other villagers with the lights and seeing how easy they were to operate and then realising that the lights would benefit them as well and be easy to operate and use in everyday life.

*Easy because they are mobile*

Numerous comments were made describing the ways in which the mobility of the lights made everyday life easier too. For example, former Provincial Council President Mr. Yatasaimaka at the nakamal also noted that even though his village was connected to the grid, electricity is fixed, the solar lights are mobile. Linked to his examples of how he uses them: to go fishing at night, digging kava, looking for shellfish. Another example given from Tanna was of the lights being used when inter-village events are being held. The lights are taken with them to other villages and used there in the preparation of food and then are also useful for the walk home in the dark. These examples provided by participants illustrate the ways in which the mobility of the solar lights help to make their current lifestyle easier.

*Easy because they are safer*

Included in the theme of ‘easy’ are a number of comments for participants that discuss the solar lights being safer. One village (Middle Bush, Tanna) talked about how much easier and safer they were during cyclone time. Wind was mentioned a few times in terms of how much safer the solar lights are when there is wind. There were also comments made about the burning of houses and how the solar lights were much safer. Another example of participants mentioning the lights being safe was a conversation with Brian and Charlie again on the Island of Tanna, two young males, and very keen on solar energy despite being in a grid connected village emphasised safety as a key feature of solar, this was for two reasons: (1) Older members of the community were noted as often being “afraid of

electricity” and did not feel that electricity was a safe source of energy and often avoided using it. (2) Children can carry it around without any concern of setting the house on fire.

*Easy because the lights last longer:*

People in the villages also mentioned the length of time that the solar lights lasted for. Typically they could last all night if they had been charged during the day. As they were cheaper (free) to run the length of time they were on from was not monitored in the same way that a candle or kerosene lamp had been. Comments indicated that this gave a sense of freedom in terms of being able to just use them when they were needed and wanted.

*Sometimes...not easy*

While the majority of the comments were positive regarding the lights themselves and the use of them, there were some stories that told of the lights not always being a successful experience. For example:

- sometimes they get cracked and then get water inside them
- condensation can get inside (from the sun when being charged)
- ash from the volcano on Tanna can affect the charging
- can get dimmer after some use
- issues with charging during the wet season – when they experience many days of rain

Mostly there was concern about the lights getting wet (during the wet season) and then not working anymore – there were sometimes stories from participants about this happening to someone who they knew and then they would show concern (often this was during focus group discussions). One village visited in Tanna showed how they wrapped the lights when charging them to stop the condensation – they were finding ways of adapting the technology to the physical environs. Others found places to hang the lights for charging during wet days where the lights themselves would not get wet. Another story was told of sending children back to the village from the garden to rescue a light when it had started raining. Hence, while there were some limitations of the technology ways of dealing with the issues were being founded and adapted into everyday practices and routines.

The discussion above highlights that reworking social norms of what constitutes ‘the easy life’ in Vanuatu was a major outcome of the *Lighting Vanuatu* project. This is, however, not surprising given that many authors have argued there has been no other ‘goal’ in international development than to make life easier, that is, to bring forth and promote new ideas of ‘the good life’ in order to establish a comfortable, less unpredictable, more productive working-class in developing countries.

## **2. Solar expectations: Mobilising aspiration through *Lighting Vanuatu***

What comes with technological convenience? Reflecting on the many different conversations of convenience and comfort today, one hears a wide range of concerns associated with the notion that technology is ‘good’ simply because it makes our lives a little easier, safer, or comfortable. From the convenience of the car, expectations of cleanliness linked to the towards daily bathing and showering, to the shifting norms of what constitutes a ‘comfortable’ and healthy heated home, each technological advancement simultaneously holds the potential to make peoples’ lives a little easier while also potentially embedding societies into often environmentally problematic systems (Shove, 2003). In other words, material culture shifts alter our expectations of what constitutes ‘the good life’, and vice versa, in ways that are both liberating and problematic. We examine the aspirations and expectations around solar that we encountered.

The large majority of household interviews expressed the expectation that there was no going back to kerosene or gas. For instance, during a household interview in Nerenigman village on Mota Lava (November 21, 2013), one respondent expressed this sense of progression by stating, “If we had to back to kerosene we would be embarrassed.” The perception being here that anything other than solar would be like falling backwards, even to the point of stigmatisation for those who still used it, as another respondent from a focus group on Mota Lava (November 21, 2013) recounted, “If we see someone using kerosene we laugh, it’s like they’re stuck in the past.” Solar energy was closely associated with progress to the degree that in the vast majority of interviews alternative energy options were rarely discussed. Alternative energy sources, were seen as a ‘backwards’, or in some instances just plain ‘bad’, even if the participants themselves had for example gone to

torches when the solar had broken. As another respondent from Emua village on Efate (November 17, 2013) exclaimed, "What else but solar!" The future trajectory of energy and lighting in Vanuatu would seem to be solar. Therefore, not only have solar lights become normalised in the everyday (see theme one), there are also high expectations that solar powered energy will light the way towards a better future in rural Vanuatu.

This confirms the statements made by the participating NGOs that one of the primary outcomes of the *Lighting Vanuatu* project was that it helped raise awareness and exposure to the option of solar power. As the vast majority of villages indicated and demonstrated through their purchases of larger solar panels (often purchased in New Zealand during the participation in the Recognised Seasonal Employer (RSE) scheme), the aspirations and expectations of the achieving a solar powered future was not limited to portable solar lighting. As awareness of solar powered lighting had exploded since the start of the *Lighting Vanuatu* programme the expectation from many of the villages visited that the future will be increasingly solar, which would include the larger housing systems as well as the convenient and mobile portable solar lights. This is expressed by a young father from Laukatai who when asked how he disposed of an earlier broken solar lamp stated, "I want to keep it as a memory [the solar lamp]. When my kids get older I want to show them what we used to use for light."

Establishing and normalising high expectations have the potential to be both a positive and negative endeavour. From the perspective of the villages interviewed the energy future of rural Vanuatu has clearly been demarcated as solar. As Shove (2003: 400) describes it, technologies of convenience, comfort and cleanliness have been the key aspirations that have produced "the locking in of technologies and practices as they move along a path dependant trajectory of socio-technological change." This raises the questions, who gains financially, politically and socially from advancing this particular vision of 'normality'? Are there any unsustainable practices associated with the introduction of 'sustainable' technologies? As we will explore in the next section, this transition simultaneously opens new pathways of energy autonomy for communities *and* creates other paths that may also lead to unwelcome or undesirable economic and political dependencies.



### **3. Vanuatu's transitional economies: Negotiation the cash & subsistence landscape**

Energy, renewable or otherwise, has played an influential role in normalising the cash economy in rural Vanuatu (and across the Pacific). Today's subsistence affluence in Vanuatu *has not* extended to the energy used to light houses and to fuel the transport needed to move people and materials around. As a result, kerosene used for lighting the home has been one of the prominent market mechanisms used to sustain and maintain a household level engagement in the cash economy. As indicated in a recent report by the Australian Agency for International Development (Cox et al. 2007), the tension between subsistence and market economic dynamics is increasingly becoming a source of anxiety for rural Vanuatu:

Local communities are under increasing stress. *The penetration of cash into the rural areas is one of the main pressures.* Cash is increasingly becoming necessary to maintain a basic standard of living. In addition to primary school fees (up to 3,000 Vatu (A\$40) per term in rural areas), households need cash for necessities (salt; sugar; soap; clothing; kerosene). These may be twice as expensive in rural areas, owing to the costs of transport (p. 12, emphasis added).

It is not surprising then that primary benefit of the portable solar lamps identified by the nearly every respondent was its cost savings. For remote rural communities a lighting source comprising a one-time capital expense was seen as preferable to the on-going variable cost of kerosene fuel. Kerosene required continuous engagement with the marketplace through constant monitoring of its supply and price, as well as regular trips to the fuelling stations.

The recent transition to solar lamps had two interrelated outcomes in terms of cost and stress reduction. Firstly, there was obvious savings associated with the transition to the solar lights. Kerosene costs typically averaged around 50 Vatu per day, or 18,200 Vatu per year (although some respondents reported up to 100 Vatu per day). As portable solar lights retail in Vanuatu for between 2000 and 5000 Vatu and last up to 4 years in some instances, depending on the particulate brand and model, it is clear that significant savings are possible (annual estimates typically ranged between 10,000 - 15,000 Vatu or 150-190 NZD per year),

thought not necessarily realised due to the subsistence economy that exists within rural Vanuatu. The one-time capital expense of solar lamps meant that the daily financial and emotional investment in kerosene fuel, discussed frequently in a negative light by participants, was a thing of the past. In addition, it was reported that women were able to work longer hours, congregating with others to weave in the evening, resulting in more money for the family.

These changes in financial dynamics through the transition to solar have spurred a second gender related outcome. As one male focus group in Mota Lava (November 21, 2013) summarised, this shift in purchasing practice has resulted in shifting the gender dynamics of household energy use; although gender roles have not radically altered with the introduction of the portable solar lights, the majority of respondents did note the fact that men were no longer in sole charge of one of the main household expenditures: energy. Once purchased there was no need for daily monitoring of the kerosene fuel, resulting in less daily marital confrontation about money issues.

Despite these financially driven benefits of solar in the mid- and long-term, the upfront cost is still significantly more than the regular kerosene payments, but the prevailing attitude across NGOs, small businesses and even within the communities themselves is one of individual responsibility through purchasing power. Two separate entrepreneurs suggested that, “if they want a better life they’ll have to pay for it”, and at the beginning of one focus group in Tanna, one of the interviewees exclaimed, “we have money, just bring stuff and we’ll pay for it”. So while it is true that the portable solar lights distributed as part of the Lighting Vanuatu program have helped establish renewable-energy autonomy, it has also encouraged a social norm where people are taking responsibilities for their own energy future. On the one hand this has the potential to lead to “the self-fulfilling dynamic of the endless pursuit of convenience” (Shove 2003: 397), but on the other it may drive a continuing renewable energy development in Vanuatu that goes well beyond solar lighting.

#### **4. Ni-Van techniques in Lighting Vanuatu: Circulation, communication & community**

One of the key outcomes of the Lighting Vanuatu project was the distribution of the lights throughout the country in considerable numbers in a short time. The uptake of the technology was rapid and extensive. It was of interest then to find out what had made possible this rapid and extensive transition to a new technology. It would seem that a vital part of the transition process were the informal networks already existing within Vanuatu that we suggest maintain a sense of community throughout the country. The circulation of knowledge and people through the many islands enabled the lights to be talked about and distributed widely. Using known NGOs with already established networks in a country where networks of people are key communication channels was a major key to the success of this programme.

The following are three examples of circulation from the data generated that illustrate how the distribution of the lights tapped into existing channels and by default also helped to maintain these channels through just being a topic of the conversation and medium of mobilisation.

1. In an interview with VANREPA's David Stein he stated that distribution channels didn't need to be made; they already existed through family networks and inter-island connections. He went on to say that the NGOs were encouraged to create distribution channels but that didn't make sense to him because they were already there.

It would seem that the distribution channels have existed for some time and are part of the way of life in Vanuatu. Taylor (2008:137) discusses the importance of *hala* in linking people across the land and its role in maintaining social vitality in the village. During the two weeks in Vanuatu whilst conducting the ICR, we witnessed a number of seemingly random events whereby people just happened to bump into others when travelling, and then would ask them to take something back to the island to which they were going. Indeed many of the lights were distributed through people from Port Vila sending them to friends or relatives in the outer islands or when someone from the village was in town they would stock up on

supplies of the lights to take back with them. It seemed that people would travel between the islands and as they did so take things for others as they went.

2. In an interview with the NGO Youth Challenge, Morresen Timatua discussed one channel they used to facilitate the distribution of the lights. They gave 50 units away to leaders in the communities (Chiefs, Parliament etc.). The free promotion worked very well as these influential players ended up buying hundreds for their respective communities, which were then distributed freely to households. Ironically this contradicts what the Western entrepreneurs were saying about changing the expectations to “purchase” a better life, bringing us to the third type of distribution channel we witnessed.

3. We also interviewed some private distributors of solar lights – who were purchasing from VANREPA or ACTIV. One private business owner had his own unique distribution network, which was a two-fold approach. First, he sent individual staff to travel to the communities directly. Some of these would set up a shop on the islands (he had two outposts at the time of the interview on the more populated islands). Second, he promoted his campaign for solar energy on National Radio to encourage those on the islands to get in contact with their family in Port Vila and send/bring back to the villages. Both these approaches were purported to have yielded successful results for his business. Further, both of these approaches tapped into ways of circulating knowledge and materials within the islands of Vanuatu.

The ideas around circulation, communication and community are positive and offer a counter narrative to the humanist view that modern technology is the source of individual alienation in modern society. The solar lights do not appear to have alienated people; rather they have extended and amplified communities. The technologies of society<sup>1</sup> that make up the socio-political system of the material good were not changed through the introduction of the solar lights. Traditions and customs remained largely unchanged; rather the lights mobilised those traditions and operationalized the Ni-Van sense of community to become circulated through the Vanuatu society.

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<sup>1</sup> Here we use the Foucaultian sense of technique to refer to a specific practice, ritual or device within a technology.

## Conclusions

In summary, this annex has emphasised the idea that any shift in material culture (e.g. from kerosene to pico-solar lamps) may be accompanied by shifting social norms (e.g. expectations and aspirations around ‘easy’ technologies) and energy practices (e.g. engaging in the cash economy in a global market place). From an Energy Cultures perspective, environmental and social equality issues cannot be solved with a quick technological fix leaving unsustainable and inequitable social norms and practices intact. In this work the Energy Cultures framework has been used to help explore some of the key themes from our fieldwork and research into the Lighting Vanuatu program.

Using the framework as a sensitizing tool we looked deeper at the qualitative, quantitative, and ethnographic data to question and raise issues with what we saw occurring as a result of Lighting Vanuatu. This has been done from an academic perspective; as academic researchers we are outsiders to the aid industry and analysing aid projects is not part of our previous expertise. Instead, we bring to this review an interest and expertise in energy transitions and the analysis of their underlying determinants, whether occurring in foreign countries or the communities in which we live. From our position as academics we came to the research project with a different perspective, and we hope that this has added value and insight as a result.

Returning to our guiding research questions provides a point from which to conclude these discussions. These were:

1. How has the technological shift from *Lighting Vanuatu* project been enabled? What are the (socio-political) conditions that have made the shift possible?
2. How can the Energy Cultures framework help to make sense of the impacts arising from the shift in lighting technology?

## **Enabling Technological Shifts**

The first question aimed to broaden the scope of this research to consider the wider context that enabled the technological shift from kerosene to solar. We examined the data from a position whereby nothing was taken for granted and questions were posed from a variety of different angles. In doing so we developed 4 themes, which have been discussed in-depth in this annex. These themes, which encompass the key elements that made such a rapid transition to pico-solar lighting possible, are discussed in terms of how they influenced the technological shift and the underlying assumptions involved.

The first theme focussed on how the solar lighting technology was easy to use, and how it made existing household practices easier. While it was interesting to see potential correlations between easiness and uptake, we questioned whether ‘easy’ is a significant enough outcome of the project. Crucially we asked that if something is made easier then what is expected to take the place of the hardship that has gone? Thinking of our own lives we know how technology has made housework ‘easy’, but having more time for paid employment is not always so. We drew upon Shove’s work (2003) in this section to explore technologies of convenience to raise questions of whether ‘easy’ is fundamentally a way of normalising paying for convenience.

The next theme incorporated ideas of expectations and aspirations, which is one of the key aspects of the energy cultures framing that helps understand technology transitions. We found that people discussed a future with bigger and brighter solar; they did not want to return to kerosene and instead wanted more solar technology. Indeed, we heard stories of people returning from the seasonal workers programmes in New Zealand with solar lights and solar panels for themselves and others in their village. Again, this is exciting from an energy transition perspective as the solar transition is represented in their aspirations for the future, though we also discussed the notion of being locked in to a technological trajectory and dependencies that could occur as a result. While this may be a possibility, the technological changes in Vanuatu will be limited by contextual aspects such as physicality (being a group of small islands with a small population), financial constraints and village

life – the same constraints that were overcome through the supply-side subsidy with the pico-lights.

This leads to the third theme, which considers the role of the cash economy in the project and the project's role in the cash economy in Vanuatu. That is, how the economy was strengthened in some ways through the Lighting Vanuatu project, yet at the same time it created a temporary departure with regards to fuel purchases for lighting (i.e. not having to continuously pay for kerosene). We discussed some of the implications of normalising paying for energy that has occurred in Vanuatu.

Finally, we consider the role of circulation and communication and the informal networks that facilitated the distribution of the lights throughout most of Vanuatu. Again from a transitory perspective, the networks that enabled this technology to literally go far and wide was significant in the success of the project. We learnt that the networks already existed and the NGOs cleverly drew upon these networks to bring about this transition. Networks and the community are a part of Ni Vanuatu culture (Taylor, 2008) and we discuss this as being the 'good news story.' This technology became part of the existing networks; it did not alienate, but rather facilitated the circulation and community that already existed, and from stories we heard of village life are also used frequently in communal village activities – perhaps because they just make it easy!

### **Using the Energy Cultures Framework**

The Energy Cultures framework enables a holistic perspective into the complexity of energy transitions and energy behaviours, accounting for interconnected elements of material culture, energy practices, and norms and aspirations, situated within a particular context. In this study we have witnessed how the mass introduction of pico-solar lights during the Lighting Vanuatu program has shifted the context in which lighting decisions were made. The existence of informal networks and communications channels as part of the Ni Vanuatu culture, combined with the successful use of these networks by the NGOs involved in the project, resulted in a large influx of new technology to a wide ranging marketplace across

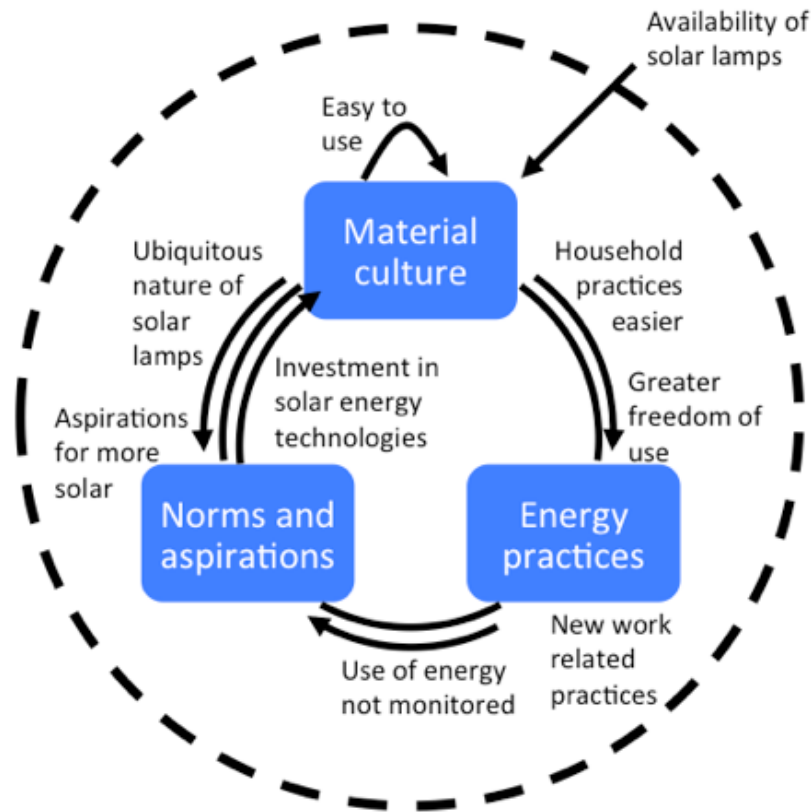
much of Vanuatu, illustrating how external influences (i.e. availability) can drive a shift in material culture (i.e. solar lighting technology).

The shift in lighting technology from kerosene to solar is also very closely tied to energy practices. It appears that for the most part household practices remain unchanged; largely existing practices are just made ‘easier’ and the mobility of solar lamps seems to be better suited to the mobile lifestyle in rural Vanuatu. However, there has been the introduction of some new practices: women are now weaving more at night, and school children, who would not previously have used kerosene lights due to the associated fire risks, are able to do school-work after dark. Additionally, the shift in lighting technology has gone hand-in-hand with a shift in financial obligations around the regular purchase of lighting fuel (i.e. the sun is free). This has resulted in greater freedom of use of lights and as such families no longer feel the need to monitor their use so much.

The shifts in technologies and practices have cultivated a corresponding shift in norms and aspirations. The ubiquitous nature of the solar lamps has increased the general awareness of solar technologies and perceptions about what a ‘good’ technology is. Solar is seen as a big step forward from kerosene, and there is a strong resistance against reverting to the use of what are seen as ‘bad’ energy technologies. Combined with the connected nature of communities in Vanuatu, and the access to solar panels through the RSE scheme in New Zealand, aspirations for larger solar lighting systems and systems capable of delivering solar power are starting to emerge.

The nature of the Lighting Vanuatu program also meant that households and communities had to make financial investments in the solar lighting technologies; the subsidies were provided for the NGOs and not the end users of the lights. This financial investment serves to solidify personal investments and the positive perceptions of solar power, and this may also drive the establishment of community level renewable energy autonomy.





**Figure 6: Transitional Energy Culture key debates**

### **Implications for the future**

Finally, as communities in Vanuatu look to further develop their renewable energy technologies, it is vitally important to consider a holistic approach to understand the various impacts that can occur. Using a framework like the energy cultures to explore possibilities and make sense of transitional impacts is useful for future planning and understanding. In concluding we finish with two points that sum up the value of this approach in making sense and ‘learning lessons’ from Lighting Vanuatu.

1. This was a rapid energy transition brought about by a number of factors not least the ability to draw upon informal cultural networks to disseminate knowledge of the lights and the material good themselves. Using the EC has enabled an understanding of the factors and the interactions of the factors in this transition. Plus delving further into some of the socio-political and economic contexts further enabled an examination of the factors in considerable depth.

2. In addition to the depth of analysis using the Energy Cultures approach has enabled a breadth of analysis. There are a variety of factors that have been considered and explored in the process of understanding the transition. Examining from this holistic perspective develops big picture type thinking and means that the unintended consequences can be considered as part of the framing. The result then builds a picture of the systems (social, economic etc) around the transitions and helps make sense of the interactions of the various elements creating a rich understanding of the dynamics of a complex process.

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