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Illumination Solar: DELIVERING Energy Poverty Solutions

[Cle-Anne Gabriel](https://iveypubs.my.salesforce.com/003A00000209ZKP), [Maree Stanley](https://iveypubs.my.salesforce.com/003A0000020CrsN), and [Shane Thatcher](https://iveypubs.my.salesforce.com/003A0000023Og5e) wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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In October 2017, Shane Thatcher, co-founder of Australian social enterprise Illumination Solar (Illumination) had mixed feelings. He was rethinking his company’s Give Power campaign. After five marginally profitable years designing and supplying portable solar lights (solar lanterns) to some of the world’s most energy impoverished communities, including refugee camps, Thatcher had decided to market his products to Australian customers for outdoor uses such as camping and hiking. Under the Give Power campaign, Illumination donated one solar lantern to a community in need, for every solar product purchased by Australian customers. However, this strategy was not successful. Thatcher’s main goal for his company was to sustainably provide good quality solar lights to impoverished people in developing countries. To reach that goal, he wondered which strategy to follow; should he return to the original business model, re-structure the Give Power campaign, or come up with something entirely new to generate higher profits?

Company Origins

Illumination was a social enterprise co-founded by Thatcher in 2009 to address energy poverty in some of the world’s poorest communities. Energy poverty referred to a lack of access to modern energy services and affected about 1.1 billion people globally.[[1]](#footnote-1) By 2017, with the vision to “help improve the health, wealth, and education of people who live without power,” the company had distributed more than 600,000 solar products in over 20 countries.

Originally, Illumination sold eco solar products in Arusha, Tanzania. From the beginning, its founders had a strong social and environmental mission. They wanted to provide a solar light that could replace the use of kerosene in households without electricity. When burned, kerosene produced toxic fumes and raised the risk of fire-related injury if used indoors. Kerosene lamps were also considered a poor source of light, making it difficult for children to study after dark. Solar-powered lights provided an effective and environmentally friendly alternative. By early 2018, Illumination had won several awards for its work, including a Business 3000+ Award in 2011, a Premier’s Design Award in 2012, and a StartupSmart Award in 2012.

SHANE THATCHER

At the end of 2017, Thatcher was a 45-year-old surfer and environmental economist. By the time he co-founded Illumination, he had spent 15 years working in the management area of the energy industry, in renewable energy business development, and as an economist in the carbon trading sector. After he left corporate life for social enterprise, Claire Heaney of *The Herald Sun* described him as a “corporate refugee.”[[2]](#footnote-2) Thatcher was dissatisfied with life in the corporate sector and wanted to have a more profound impact on the lives of people affected by energy poverty around the world.

Energy Poverty and Portable Solar Lights in Developing Countries

Energy poverty referred to a lack of access to modern energy services.[[3]](#footnote-3) The “absence of sufficient choice in accessing adequate, affordable, reliable, high-quality, safe and environmentally benign energy services”[[4]](#footnote-4) had negatively affected the well-being of large numbers of people in both developed and developing countries worldwide. Lack of access to electricity was one of the most critical challenges they faced. Despite improvements in access to electricity, it was estimated that one of seven people globally lived without electricity in the home (see Exhibit 1).[[5]](#footnote-5) Countries in sub-Saharan Africa and developing Asia continued to have the lowest rates of access, particularly for those living in rural areas. For this reason, Illumination targeted end users in these markets.

Portable solar lights and solar lanterns became an accepted solution to the challenge of electricity access. The lights contained photovoltaic solar panels, which captured energy from the sun and converted it to electricity. Compared to kerosene lamps, solar lights were considered a safer and more environmentally sustainable source of light for rural households in developing countries. In addition, the portability of solar lights made them an ideal solution for communities in remote locations not connected to a centrally-controlled electricity network infrastructure. Although the United Nations did not consider homes powered solely by solar lights “fully electrified,”[[6]](#footnote-6) solar lamps changed the lives of many people. An estimated AU$27 billion[[7]](#footnote-7) was spent on traditional portable lighting sources (e.g., kerosene lamps, battery torches, and candles) each year by the 1.2 billion people who were living without access to electricity. In the previous decade, over 20 million non-generic pico-solar products were sold, and the market had grown to include over 100 companies.[[8]](#footnote-8) Of concern, however, was the growth of the generic market. Combined sales of both the generic and non-generic markets were estimated to be as high as 44 million units in 2016.[[9]](#footnote-9)

Portable solar lights made a difference in the lives and livelihoods of many households around the world. In areas where electricity was either unaffordable or unavailable, the lights enabled children to study after dark. In communities where handicrafts were an important source of income, portable solar lights improved quality and output enhancing the livelihoods of many. The following testimony, reported by Illumination’s Give Power Mozambique project, illustrated the impact of portable solar lighting:

“With Mandarin 2 Solar Lights, our children will study longer. Our eldest likes to teach his siblings but has to stop when it gets dark,” says Joaqim Faniero from Bomba Village. The children will also be much safer. An incredible 1 in 3 of the residents have direct experience of their home or a friend’s home burning down due to kerosene lamps or candles.[[10]](#footnote-10)

The quality of solar lanterns has also made a difference in the lives and natural environment of end users in developing countries. The IFC-World Bank Lighting Global program and other similar initiatives endorsed a select range of high-quality solar light products for distribution to communities in developing countries. According to Lighting Global’s Pico-PV Quality Standards,[[11]](#footnote-11) these products needed to pass various tests including quality of light, durability, battery safety and durability, and truth-in-advertising. There was an expectation, therefore, that businesses supplying solar lanterns would use these standards to determine the best products for their respective markets. The best quality solar lanterns produced optimal lighting conditions for night time uses and lasted longer, thereby postponing environmental issues in developing countries, caused by the disposal of the products and their batteries.

The Supply Chain for Portable Solar Lights in Developing Countries

Although the supply chain for solar lanterns varied from country to country, stakeholders in the solar lighting market chain included manufacturers, logistic and transport providers, and distributors—mainly large non-governmental organizations (NGOs). In developing countries, the supply chain was usually a variation of three main stages. First, solar lantern importers liaised with overseas manufacturers to bring the product into the country. Second, the importers either acted as distributors themselves or passed on the imported product to local distributors. Third, local retailers received stock of the solar products, which they sold in local communities to individual households.

There were many options for variation along this supply chain. For example, local co-operatives or NGOs often sold or donated (if funding was available) products to end users, creating an additional step in the supply chain between retailers and households. Illumination was a distributor and importer in the developing countries in which it operated (see Exhibit 2).

Issues with supply chain development and management were also prevalent. In 2013, Lighting Africa commissioned a report examining the supply chain for solar lighting products. Globally, there were numerous challenges. In Mali, in particular, the supply chain faced three challenges: lack of consumer and retailer awareness of solar light technology, lack of affordability for retailers and consumers, and limited after-sales support.[[12]](#footnote-12)

Lack of Consumer and Retailer Awareness of Solar Light Technology

Despite ongoing market growth, there was a lack of consumer awareness of portable solar power products, particularly when comparing Mali with East Africa. Low product demand from retailers and customers acted as a disincentive for suppliers.

Lack of Affordability for Retailers and Consumers

Although portable solar products were more affordable in the long run, removing ongoing costs associated with traditional portable lighting, such as kerosene or batteries, the upfront cost was higher. Many people did not have the means to purchase portable solar products, particularly higher-quality brands.

Limited After-sales Support

Retailers did not have the resources to provide adequate post-sale support. Reasons included a lack of technical training or capacity to offer product warranties. In addition, the remoteness of many end users made last-mile distribution and after-sales support a significant logistical challenge. This had a negative impact on both consumer trust and knowledge of portable solar products.

Distribution channels and associated difficulties varied from one country or city to another. The South Sudan city of Wau, for example, had its own issues. Wau was situated closer to the border with Sudan and the supply chain of solar-powered goods involved trucks smuggling goods through the unofficial border crossing between Sudan and South Sudan, called New Sudan, to reach Wau. Goods were then taxed when they reached Wau.[[13]](#footnote-13)

The road network on this route was not good and was not passable by truck during the rainy season. Solar power retailers in Wau were Sudanese and a significant portion of the supply chain to Wau was made up of Sudanese individuals. Retailers in Wau placed orders in groups of up to 20 people per truck, to Sudanese traders located in China and Dubai. These products were then shipped to Port Sudan in Sudan, driven overland to Khartoum, and then trucked to Wau.[[14]](#footnote-14)

International commitment

In 2015, world leaders agreed to adopt 17 Sustainable Development Goals as part of the United Nations 2030 Agenda for Sustainable Development. Goal 7 specified commitment to universal access to “affordable, reliable, sustainable and modern energy for all” by 2030.[[15]](#footnote-15) The Energy Access Practitioner Network supported this goal, connecting stakeholders from the private and social sectors in over 170 countries to enable a collaborative approach to ensure the target of energy for all by 2030.[[16]](#footnote-16)

In May 2018, there were 403 partnership initiatives listed against Goal 7. Of these, 56 were specifically targeted to improve infrastructure and technology for sustainable energy services in developing countries.[[17]](#footnote-17)

Illumination Solar

In the solar market, there was often a trade-off between quality and price. Most end users were unable to afford the best quality solar products. Instead, they purchased low-quality lanterns that were not durable, poorly designed, or produced low-quality light. Renewable energy entrepreneurs warned that this poor reputation would make end users in emerging markets averse to solar technology, having the unwanted effect of slowing uptake in the communities that needed it most.[[18]](#footnote-18) To address this challenge, Illumination developed its own efficient solar light—the Mandarin Ultra. When it was first developed, the product retailed at a price equal to about two months’ supply of kerosene. Illumination was also able to access the European Union Emission Trading Scheme, claiming credits to reduce the price per unit for end users. Later, the company expanded its product range to include solar-powered radios and mobile chargers.

From its roots in Arusha, Tanzania, Illumination soon expanded to the rest of Eastern Africa. Its solar products were also appearing in other emerging markets in Southeast Asia. The enterprise initially operated under five managers. In January 2018, due to profitability and supply chain challenges, Thatcher was the sole manager of the enterprise and was based in Australia. Illumination’s main competitors in Australia included Kathmandu Limited and Anaconda Group Pty Ltd, who also supplied portable solar lanterns. However, the lanterns of these two competitors were marketed mainly for use in camping and other outdoor leisure and adventure activities (see Exhibit 3).

The Aid and Development Model—Partnering with Non-Governmental Organizations

In its early days in Tanzania, Illumination integrated itself fully in the supply chain for its solar products. Thatcher and the other managers at the time did not just design the lights, they also commissioned manufacturing in China and managed delivery from the manufacturer to NGOs and aid agencies on the ground in impoverished communities of emerging markets. Thatcher learned quickly that creating and maintaining distribution channels could be costly and difficult, particularly in emerging markets. A significant ongoing challenge for Illumination was the need to create distribution channels while preserving a low unit price for the consumer. As Thatcher explained, “In some markets it is possible to increase the market profile of the product to justify its price, but when you are working within communities who are experiencing energy poverty there is little opportunity to do that because people cannot afford the product at the end.”

This triggered his first business model change. Thatcher and his team decided to sell the distribution aspects of the enterprise and focus instead on designing and marketing a useful, good quality product. Thatcher focused on establishing relationships and successfully tendering to aid agencies and other NGOs who could deliver his solar products as part of aid packages on the ground in impoverished communities. Illumination’s Mandarin products became so popular that aid agencies and NGOs requested them by name. Thatcher and his then-partners would introduce these agencies to their distribution partners who would coordinate the delivery of the products. Partnerships with these organizations enabled the distribution of Illumination’s products in refugee camps and areas struck by disaster.

However, as Illumination began winning more tenders and Thatcher’s Mandarin products became more recognized, other organizations began copying Illumination’s products. While some of these products were cheaper, they were not necessarily better value—they were often less durable and produced a much lower quality of light. Illumination worked with a dual mission of providing both affordable and environmentally sustainable lights, and refused to compromise on quality. However, the company found it increasingly difficult to compete on price and started losing tenders. As the sole manager of the enterprise, this new challenge led Thatcher to change focus a second time, adopting a new business model.

The Give Power Model

As competition increased and profits declined, Thatcher began looking for new ways to generate income, while getting his solar products to communities that needed them. He noticed that staff, friends, and family were borrowing lights and chargers to go camping on weekends. He realized that there was a market for the company’s products in Australia. This led him to establish Give Power. For every solar product purchased in Australia, Give Power would donate a solar light to a household in need in communities in an emerging market.

Under Give Power, Thatcher also established a corporate gift-giving model. Working with several other foundations, this model had some success, particularly in the Philippines. Over a 12-month period, Illumination partnered with the Morris Family Foundation, Kadasig Aid and Disaster Relief, and Path Foundation to distribute solar lights and chargers to 1,200 families living without electricity in countries such as Mozambique, Indonesia, and the Philippines.

However, by one year later, the Give Power program was still not as successful as Thatcher had hoped. The cost of maintaining the program was too high. Specifically, the marketing, product development, and distribution costs of both the buy-one give-one program and the corporate gift-giving model outweighed the income generated. After all, there was considerable logistical effort involved in donating one lantern only occasionally, after an Australian customer purchased one of the products. Without significant sales through the remaining NGO and aid agency partnerships, the Give Power program was not able to efficiently provide solar products to families living in energy poverty. Yet, similar initiatives by communities and NGOs had been successful in Australia (see Exhibit 4). In 2017, Illumination had an annual turnover of $400,000, compared to over $2,000,000 in 2013. Sales of Mandarin solar lights dropped to 80,000, from 250,000 in 2013. Under the Give Power campaign, Illumination distributed less than 5,000 solar lights, which sat in contrast to the 600,000 lights distributed to refugee camps with the previous business model.

What next?

The International Energy Agency’s 2017 World Energy Access Outlook suggested that there has been considerable improvement in the number of people with access to power. It credited the decreasing cost of decentralized solutions and “the emergence of new entrepreneurs”[[19]](#footnote-19) as an important contributing factor.

Thatcher wondered if he should reinvest in Illumination’s original aid and development model, making solar lanterns available to the world’s most energy poor through partnerships with NGOs and aid agencies. Alternatively, he wondered how he could improve his success with the Give Power strategy. Or were there other models that Thatcher should consider?

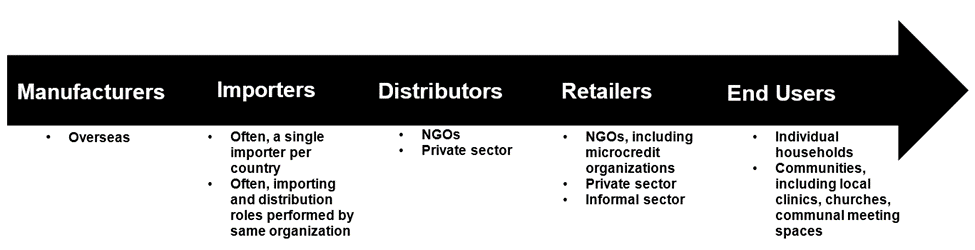
Thanks go to Anna Krzeminska for her contribution to the case.

Exhibit 1: Electricity access by developing region and year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Region** | **Rate of Access (%)** | | | | | | **Population without Access (in Millions)** |
| **National** | | | | **Urban** | **Rural** |
| **2000** | **2005** | **2010** | **2016** | **2016** | **2016** | **2016** |
| **WORLD** | **73** | **76** | **82** | **86** | **96** | **73** | **1,060** |
| **DEVELOPING COUNTRIES** | **64** | **69** | **76** | **82** | **94** | **70** | **1,060** |
| **Africa** | **34** | **39** | **43** | **52** | **77** | **32** | **588** |
| North Africa | 90 | 96 | 99 | 100 | 100 | 99 | <1 |
| Sub-Saharan Africa | 23 | 27 | 32 | 43 | 71 | 23 | 588 |
| **Developing Asia** | **67** | **74** | **83** | **89** | **97** | **81** | **439** |
| China | 99 | 99 | 99 | 100 | 100 | 100 | — |
| India | 43 | 58 | 66 | 82 | 97 | 74 | 239 |
| Indonesia | 53 | 56 | 67 | 91 | 99 | 82 | 23 |
| Other Southeast Asia | 67 | 76 | 83 | 89 | 97 | 82 | 42 |
| Other Developing Asia | 32 | 39 | 53 | 73 | 87 | 65 | 135 |
| **Central and South America** | **87** | **91** | **94** | **97** | **98** | **86** | **17** |
| **Middle East** | **91** | **80** | **91** | **93** | **98** | **79** | **17** |

Source: “Energy Access Database,” International Energy Agency, accessed May 13, 2018, www.iea.org/energyaccess/database/.

Exhibit 2: typical supply chain for solar lights in developing countries

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Note: NGO = non-governmental organization

Source: Created by the case authors

Exhibit 3: COMPARISON OF ILLUMINATION AND COMPETITORS IN AUSTRALIAN MARKET

|  | **Illumination Solar** | **Kathmandu Limited** | **Anaconda Group Pty Ltd** |
| --- | --- | --- | --- |
| **Company origins** | Established in 2010 to address energy poverty, this Australian company designs, develops, and distributes its own eco solar products. | Founded in New Zealand in 1987, this company sells camping, hiking, and outdoor equipment, mostly Kathmandu branded. | Established in 2004 by an Australian family, this company stocks a large range of camping and leisure equipment brands. |
| **Company mission and principles** | *“To help improve the health, wealth and education of people who live without power.”* | “*To inspire and enable people to live their dreams of travel and adventure*.” | *“To inspire, equip and enable, we will help people enjoy the benefits of outdoor-oriented recreation, encouraging happier and healthier lifestyles.”* |
| **Sale and distribution model (for portable solar lanterns)** | Lanterns are sold online. | Lanterns are sold through its 115 stores in Australia or through other retailers. | Lanterns are sold through its 35 stores across Australia and online. |
| **Solar lantern product** | **Mandarin 2**  Luminance: high: 100 lumens; medium: 60 lumens; low: 15 lumens  Charge time: sun: one-hour charge for one hour light (medium setting); six to eight hour total charge  Hours of light per charge: high > 2 hours; medium > 6 hours; low > 15 hours  Rechargeable batteries: three AA 600mAh Ni-MH (replaceable)  Total weight for portable solar: 215 g  Total cost for portable solar: AU$27.50 | **Goal Zero Lighthouse Mini**  Luminance:210 lumens  Run time: brightness can be adjusted up to 500 hours on low  Cost of lantern: AU$99.98  To recharge using solar power, the light can be plugged into or Nomad 7 Solar Panel (AU $159.98).  Weight: 260 g  May be compatible with other solar panels.  Total weight for portable solar: 486.8 g  Total cost for portable solar: AU$259.96 | **Coleman Vanquish Spin 550 Lantern**  Luminance:high: 550 lumens; medium: 200 lumens; low: 50 lumens  Run time: 15 hours on high; 45 hours on medium; 300 hours on low  Cost of lantern: AU$79.99  To recharge using solar power, use the BioLite Solar Panel  Cost: AU$149.99  Total weight for portable solar: 390 g  Total cost for portable solar: AU$229.98 |
| **Social partnerships and initiatives** | Give Power provides solar lighting to end-users in developing countries. | Partnerships with over a dozen organizations to achieve sustainability goals and strategies include Australian Red Cross, Australian Himalayan Foundation and Sustainable Apparel Coalition. | Partnerships include Big 4, Murdoch Children’s Research Institute, Places We Go, and Heat the Homelessness. |
| **Examples of awards, certifications, recognition, and endorsements** | Business 3000+ Award in 2011, Premier’s Design Award in 2012, and StartupSmart Award in 2012 | Bankia Large Business Sustainability Leadership award; ranked second in the outdoor and sports category of the 2017 Textile Exchange Preferred Fibres and Materials report | Not applicable |

Source: “About Us,” Kathmandu, accessed June 12, 2018, www.kathmanduholdings.com/about-us/our-history; “About Illumination,” Illumination, accessed June 12, 2018, http://illuminationsolar.com.au/about-us; “Values that Drive Us,” Kathmandu, accessed June 14, 2018, www.kathmandu.com.au/careers/values-that-drive-us; “About Us,” Anaconda Unit Trust, 2018, accessed June 14, 2018, www.anacondastores.com/about-anaconda; “Social Responsibility,” Anaconda Unit Trust, accessed June 14, 2016, www.anacondastores.com/community/social-responsibility; “Portable Solar Light—Mandarin 2,” Illumination, accessed June 14, 2018, http://illuminationsolar.com.au/produc t/mandarin-2-solar-light; “Lighthouse Mini,” Goal Zero, accessed June 14, 2018, www.goalzero.com.au/shop/lighting/lighthouse-mini/#.WylhDkiFNPY; “Extract Goal Zero Lighthouse Mini,” Kathmandu, accessed June 14, 2018, www.kathmandu.com.au/goal-zero-lighthouse-mini.html; “Nomad 7 Solar Panel,” Kathmandu, accessed June 13, 2018, http://gear.kathmandu.com.au/gear/Nomad-7-Solar-Panel; “Coleman Vanquish Spin 550 Lantern Red,” Anaconda Unit Trust, accessed June 14, 2018, www.anacondastores.com/camping-hiking/camp-lighting/lanterns/coleman-vanquish-spin-550-lantern/BP90099801; Kathmandu, *Sustainability Report 2017*, accessed June 14, 2018, www.kathmanduholdings.com/wp-content/uploads/2012/08/Kathmandu-Sustainability-Report-2017.pdf.

Exhibit 4: selection of australian initiatives similar to illumination’s give power

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Australian Non-governmental Organization (NGO) Co-operation Program (ANCP):**  **Bringing Light to Rural Communities** | **Business Partnerships Platform: Connecting Communities to Clean Energy and the Digital Economy in Papua New Guinea (PNG)** | **SolarBuddy: Buddy2Buddy Program** |
| **Program details** | The ANCP is a grants program for accredited Australian NGOs delivered by the Australian government. | The Business Partnership Platform is a collaboration between private enterprise and government. *Digicel* is a well-known corporate mobile communications provider within PNG, an important factor in the potential success of distributing and selling solar power solutions within this market. | School communities raise funds for the purchase, building, and distribution costs for each student to participate in the program. School children assemble the lanterns in class. These lanterns are then distributed to families experiencing energy poverty elsewhere in the world. |
| **Countries** | Solomon Islands | Papua New Guinea | India, Uganda, Kenya, Tanzania, Tibet, Thailand, Myanmar, Vanuatu, and Papua New Guinea |
| **Organizational partners** | Anglican Overseas Aid | Digicel | Australian schools |
| **Investment and activity in solar energy** | Solar lighting provided for approximately 400 families | Solar lanterns (in addition to other solar energy solutions and access to the digital economy) distributed through Digicel’s existing supply chains | Cost for SolarBuddy lights from AU$25 each |

Source: “Bringing Light to Rural Communities,” Australian Government, Department of Foreign Affairs and Trade, January 14, 2016, accessed June 14, 2018, http://dfat.gov.au/aid/who-we-work-with/ngos/ancp/news/Pages/bringing-light-to-rural-communities.aspx; “Connecting Communities to Clean Energy and the Digital Economy in PNG,” Australian Government, Department of Foreign Affairs and Trade, accessed June 14, 2018, http://dfat.gov.au/aid/who-we-work-with/private-sector-partnerships/bpp/Pages/connecting-communities-to-clean-energy-and-the-digital-economy-in-png.aspx; “Schools,” SolarBuddy, accessed June 14, 2018, https://solarbuddy.org/about-solarbuddy/.

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7. AU$ = Australian dollar; AU$1 = US$0.77 on March 31, 2016; all currency amounts are in AU$ unless otherwise specified. [↑](#footnote-ref-7)
8. Bloomberg New Energy Finance, op. cit., 2. [↑](#footnote-ref-8)
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