

The Test

A personal chronicle of a defining mission for humankind

by Jeremy Leggett

**Expensive high-carbon oil-for-lighting: hundreds of millions of users.
Inexpensive zero-carbon solar-for-lighting: tens of millions of users.
We need to fix this conundrum, or what chance do we have with
our many tougher problems? We must rid the world of oil-burning
kerosene lamps as soon as we can. If enough of us work together, in
clever enough ways, we might amaze ourselves how easy we find it.
And in the process, we might just inspire the world for the bigger
tasks.**

Chapter 1

4th July 2017

Royal Albert Hall, London

The great auditorium is decked out as though for the Oscars. Closely packed circular tables are laden with linenware, glassware, silverware. There are tables even in the boxes where elites sit for concerts. Behind the stage where the orchestras and bands normally play, velvet drapes soar to the domed ceiling, dripping with glitter. Spotlights throw shafts of mauve through air more accustomed to arias, finales, Land of Hope and Glory.

The awards are not for the movie industry tonight. Nor the music industry. They are for the business world. The Prince of Wales's Business In The Community organisation is staging its 2017 Responsible Business Awards.

More than a thousand company executives from more than a hundred companies sit with their companions listening to the chatter of two celebrity BBC presenters, one from television, one from radio, whose job it is to announce the winners. These happy folk come and go, to blasts of brassy music and loud cheers from the tables where their corporate entourages sit.

I try not to grind my teeth. Most of the seats here cost £450. I can't help a few uncharitable thoughts in consequence. I'm like that. I while away awards dinners calculating how many Malawians can be fed or educated, or both, for the half a million pounds a concert-hall full of rich people spends on a single evening of fine food and champagne.

I know I shouldn't. I don't hesitate to spend £100 on an occasional round of golf. A grown man whacking a piece of plastic around manicured lawns, burning money while one in nine fellow humans go malnourished.

But here is the thing. The thing, I tell myself on a regular basis, is to do *something*. And most of the people in the Albert Hall tonight *are* doing something.

In any case, there is more than sniffiness about opulence behind my teeth grinding. I am concerned that an organisation I founded might actually win one of the awards.

There are nine trophies to be handed out tonight, in different categories of responsible business. The penultimate one, sponsored by global retail giant Unilever, is the Global

Development Award. SolarAid's wholly-owned retail operation, SunnyMoney, is on the short list for this award. The problem I have is that I do not view either SunnyMoney, non-profit seller of solar lights in Africa, or SolarAid, charitable fundraiser for such selling, as success stories. There is a part of me that is almost appalled that we might win. If we are indeed as good as it gets in the corporate world's contribution to global development in 2017, I tell myself, then God help the poor in Africa.

The tables are for ten people, and I have ten companions this evening. They are all on one table, and I have volunteered to be the odd man out. I am sitting at a table across the hall from them. They are from SolarAid, SunnyMoney, and Yingli Green Energy, the Chinese solar manufacturer with whom we are partnered in developing new solar lights. I refused to permit a single penny of SolarAid money to be spent on even a single SolarAid or SunnyMoney attendee. Yingli then offered to pay for the whole table.

They are probably having a better time without me around. For most of the ten year history of SolarAid, I have been Chair of the board, and the organisation has been run by chief executives. But since January, and the tragic retirement through ill-health of the latest incumbent, a brilliant man, I have been a reluctant acting chief executive. This is not how I expected to be spending most of 2017. I have told the youthful team that there will be two GOGLAs in their lives until the next chief executive takes over, in September. One is the Global Off Grid Lighting Association, the trade body of the solar lighting industry, of which SolarAid is an active member. The other is their temporary boss: Grumpy Old Git Lacking Appreciation.

Here is why I tend to grumpiness. The number of people without access to grid electricity in our world is in excess of a billion. Many of the billion-plus, if they can afford it, are forced to use expensive oil-for-lighting in the form of filthy and dangerous kerosene lamps. This costs them nearly \$80 a year, in the countries where SolarAid operates. A solar light, in utter contrast, costs the end-user a one-off payment of \$5, in the case of the Yingli-SolarAid SM100: one of the most affordable solar lights in the world today. That light will last a minimum of three years and more likely five.

Do the math, as Americans like to say.

SolarAid's SunnyMoney, or indeed any other of the hundred-plus solar lighting companies operating in East Africa, can sell solar lights that free up cash for the buyer - just from cancelled kerosene costs - in excess of \$225 over the lifetime of the product. Many of the buyers are

people trying to live on little more than a dollar a day. \$225 is a huge sum for them: a sum that can be spent on food and other necessities, in a time where famine is stalking the continent.

The term “no brainer” is often used to describe attractive economic propositions. This is well beyond no brainer. Each solar light is effectively a licence to print money for the poorest of the poor, and in fistfuls of dollars every year.

So how many solar lights has the global solar lighting industry sold to the global community of a billion souls languishing without grid electricity? The Global Off Grid Lighting Association recently [published](#) cumulative figures for through to 2016, for branded lights with verified quality standards. The answer is shocking: less than 30 million.

It gets worse. The GOGLA figures also show - at a time of soaring global sales of larger-scale solar systems - that sales of solar lights have actually been *falling* in 2016.

How can that be? What is going on? Why are we letting all that free money go to waste, never mind all the other social benefits of solar lights?

SolarAid’s sales via SunnyMoney have fallen too. In part that is by design. Our model is different to the for-profit model of most solar lighting operations. We exist to kick start solar markets for others. We use philanthropic funding raised by SolarAid to fund retail operations by SunnyMoney that sell solar lights to African people without making a net profit, so that they can resell the lights for profit. In this way we create jobs, get solar lights into the hands of end users, trigger cash savings some of which gets spent on more solar lights, and so prime a market. The more we pump frontier markets this way, the more likely they are to take off, so that conventional commercial companies can take over from us.

Unlike many another potentially big idea, we know this one can work. We catalysed the first two African solar lighting markets between 2012 and 2015, in Kenya and Tanzania. We define a catalysed market as one where more than 10% of kerosene lamps have been displaced. Key peers in the solar lighting industry, not least GOGLA itself, agree that SolarAid was primarily responsible for the takeoff of these markets. They want us to repeat the act as many times as we can in Africa’s as-yet 50 uncatalysed markets.

But this is to gloss over our weaknesses and failings. We were too slow to exit the markets we had catalysed in 2015. As fully commercial companies piled in behind us, backed by hundreds of millions in venture capital, we found our sales plummeting, and almost overnight – or so it felt to me – faced an existential cash-flow crisis. In 2015 and 2016 we fought to stabilise

our sinking ship. After an ocean of pain, we just about managed to do so. Now we are trying to catalyse frontier markets in Malawi, Zambia and Uganda. But we are resource limited and struggling, as things stand.

Hence my embarrassment at our being short-listed for the BITC Unilever Global Development Award. It is compounded by my sense of personal responsibility for the cash-flow crisis. As chair of the board and founder, I could have pre-empted the crisis by leading development of an exit strategy appropriate for the catalysed markets. I didn't even have one drafted. I made the elementary mistake of thinking that because sales had gone exponential so quickly, they could continue to grow almost by default.

OK, other colleagues signed off on this too. But the mistake is so obvious, with the benefit of hindsight. I could and should have seen it coming.

Back to the Albert Hall. On the SolarAid-SunnyMoney-Yingli table of ten, I am sure excitement is growing. We are on the short list for the award thanks to the passionate pitching of a trio of three to a very senior panel of judges from companies including Unilever, Bank of America and Coca-Cola. Jamie McCloskey of SolarAid covered the SolarAid/SunnyMoney model, our history and prospects. Lorraine Hammond of SolarAid talked numbers. Carolin Staehler of Yingli recounted our joint product-development story.

I was in Mexico at the time, on wider solar industry duty. Probably just as well.

The time for the Global Development Award arrives. Unilever's Chief Sustainability Officer, Jeff Seabright, comes onto the stage to present it. The drums roll, and there is the usual fumbling with the envelope. Or did I just imagine that. At this point I am not concentrating.

A shared top prize. And the winners are, in the small business categorySunnyMoney. Smile on fixed, Leggett, I tell myself.

The dramatic music blasts and dining companions reach to shake my hand as I stand up.

Across the Albert Hall I see four of my ten rise ecstatically from their seats: the three from the pitch team, and the Zambian Operations Director, Alex Burrough, who happens to be in London on leave.

The others are clapping quite as loudly as the Barclays table did when their award was announced.

We troop to the stage.

10th - 11th July, 2017

Astana, Kazakhstan

The Expo of 2017 has the topical theme of 'Future Energy'. Astana, the city in the steppe, is adorned with banners the length of the road in from the airport, and many of them suggest that solar and wind energy are the centrepiece of this future. This is somewhat remarkable, considering that Kazakhstan is plentifully endowed with oil, coal and gas.

But these days even major oil producing nations appreciate that a great global energy transition is looming before them. The Crown Prince of Abu Dhabi has [told](#) his people they will be exporting no more oil by 2050, and not unhappy about it, given all the clean energy fundangoes they will have invested their oil money in in the interim. The ruler of Dubai has [signed](#) his nation up to fully 75% of national energy from clean sources by 2050, and a solar roof on every building by 2030 en route. Even Saudi Arabia is getting in on the game of late, with a \$50bn [push](#) into solar and wind. Kazakhstan is in good company.

Five years ago, I helped Astana win the Expo, in competition with other short-listed cities around the world. The Kazakh government invited me and a renewable energy expert from the International Energy Agency to make the opening pitch to the judges: commissioners from the Bureau International des Expositions. Our brief was simple: paint a picture of the clean energy revolution in as wonderful a light as you can. Now I have been invited back, to do essentially the same thing, updated, at a conference in the Expo itself.

Much has changed in those five years. The Expo site looks as though it has been descended on by every eminent architect in the world, armed with a simple brief to avoid straight lines and very few other instructions. The brand new mini town they have collectively designed is a polymict eruption of curved walls, domes, and spheres. The conference centre I am speaking in is a marbled marvel of bends. Kazakh families and foreign visitors wander the boulevards and pavilions where the nations of the world are staging exhibitions of their versions of what Future Energy looks like. Again, images of solar and wind abound.

Since the night in the Albert Hall, I have been thinking hard. The idea has grown on me that the conundrum of expensive and high-carbon kerosene vastly outselling inexpensive and zero-carbon solar is a defining test of humankind's instinct for collective survival. If we cannot

quickly replace oil-for-lighting with solar lighting, given all the blindingly obvious economic and social imperatives for so doing, what chance do we have with all the many other global problems we face? In an age of climate treaties and UN Sustainable Development Goals, where we are making progress on many fronts, how can we be taking so long to kick this open goal? How can we be failing this test?

One of the 17 United Nations Sustainable Development Goals sets a target for when we should pass it by. Goal 7 entails ensuring “universal access to affordable, reliable and modern energy services” by 2030. 190 world leaders signed off on that, in 2015. At the rate of progress since, with a grand total of less than 30 million lights in the hands of the 1.2 billion, there is precisely zero chance of achieving it. We must greatly accelerate the deployment.

I ponder the message to deliver in Astana. I could easily portray the global energy transition today in even more upbeat terms than were possible five years ago, both in terms of accelerating progress with clean energy - other than solar lights - and snowballing setbacks for fossil-fuels. But I dare not leave out the story of kerosene-versus-solar. It is simply too much of a thorn in the side of optimism.

I have been asked to give two presentations on two consecutive days. I elect to make the first a bullish celebration of how fast the solar element of the clean-energy revolution is unfolding, and the second a tale in two parts: initially an optimistic exploration of how battery storage, electric vehicles and energy efficiency can accelerate the clean-energy revolution, followed and much tempered by the The Test.

The first morning. My first presentation, the second of two opening keynotes. I suggest that the global energy transition is unfolding much faster than most people realise. New global renewable power generation capacity [exceeded](#) new fossil fuel capacity in 2015 & 2016. Onshore wind and solar will become the cheapest two options in many nations by 2020, analysts [profess](#). Solar seems set to become the cheapest power on Earth, Bloomberg [reports](#): it is already less than half the price of coal in recent auctions. Many nations, states, cities, and corporations are eagerly leaping aboard the revolution. California now [mandates](#) 100% renewable power by 2045. More than 1000 cities and 100 major companies target 100% renewable power. Canberra plans to hit 100% by 2020, Google by 2017. Employment reflects all this. There [are](#) now many more US workers in solar and wind than in coal and gas: 475,000 compared to 55,000 in coal mining.

Meanwhile, fossil fuel investments are [nosediving](#). It is easy to see why. Coal looks to be in terminal decline. China's new coal plants [make](#) “no economic sense”, the International Energy Agency has concluded. Despite huge cuts in expenditure, most oil majors couldn't even [cover](#) their costs in 2016, even at an average \$50 oil price. The industry is [piling](#) up a mountain of debt just to keep operating. Its business model is broken at a systemic level. France now intends to [ban](#) all oil and gas exploration. The oil company with the highest share price in North America, Suncor, is [favoured](#) by investors because it has said it will stop looking for oil, and give the expenditure saved back to investors as dividends. Meanwhile long-term oil investors have begun giving up on the industry, and [switching](#) to renewables.

Bullish as clean energy industry practitioners like me are about all this, Silicon Valley gurus are more so. By 2030, Tony Seba [professes](#), all new energy will be solar and wind, all new cars will be electric vehicles. Oil and gas demand will be in steep decline.

This is total system change, and it has happened before, in little more than a decade, when the the horse-drawn carriage was displaced by the horseless carriage, otherwise known as the motor car.

You don't have to believe enthusiasts like me on this, I tell the audience. As the popular BBC tech programme Click [concluded](#) recently, “The solar revolution is coming... fossil fuels could be facing extinction.”

Kazakhstan has chosen the theme of its Expo well.

On the afternoon of the first day I take some time to explore the Expo site. The first pavilion I come to, walking clockwise from the main gate, is not a national exhibition, but a company one. Shell's logo adorns a tent with the theme “Make The Future”. The exhibition inside subtly advances Shell's view that oil and gas have to be the backbone of making the future, when it comes to energy. The only putative future vehicles on display are all designs by students. They look like amateur night at the whacky races. There is not a hint of what is going on at Tesla, Daimler, and all the carmakers whose innovation permits nations and cities realistically to contemplate and in some cases already begin setting targets for completely banning internal combustion engines, diesel and otherwise. Similarly with the treatments of solar and wind: no sense at all that these technologies are the cheapest available in some countries, and set to be

the cheapest in most countries in just a few years. As for oil, not a hint of the debt mountain being built up by the oil industry as it pursues its flawed business model. A big picture of the Kashagan oilfield in Kazakhstan, in which Shell has a major stake, is prominent in the exhibit. There is no mention of how many years that project was delayed by, in the face of costly and unforeseen technical problems, and how many billions of Euros it was over budget. Shell employees came to dub the Kashagan project CashAllGone. I know because they told me.

Shell might just as well have been honest and put up a statement of their basic message: “Grown ups get their energy mostly from fossil fuels, and their motive power mostly from the internal combustion engine, and so they will for decades to come.”

Here, then, is one aspect of The Test. Can a company like Shell switch from being a barrier to future clean energy, to being part of the solution? In the case of the kerosene-solar conundrum, can it play a material leadership role in getting rid of an entire, indefensible, category of oil use?

Other oil companies are doing better than Shell are, as things stand, when it comes to renewable energy. Norway’s Statoil has set up a renewable energy division, and is playing to its offshore engineering strengths by pioneering the development of floating wind farms. This work holds the potential for dramatic reductions in the cost of offshore wind. Total, the French oil and gas major, has invested hundreds of millions in solar, batteries and other elements of the clean energy revolution. It also sells solar lights of its own design and production. The company recently [sold](#) its 2 millionth light, outstripping SolarAid’s 1.9 million. It sells most of its lights from petrol forecourts across Africa. Total targets 5 million lights by 2020: not enough, in my view, but miles better than any other oil company. I sent a note of congratulations to the Senior Vice President for Sustainable Development & Environment, Jerome Schmitt, when they passed 2 million. I received a charming reply. “We definitely share a comparable journey”, he said.

Could I ever imagine such an interaction with Shell? Not today. But history is not destiny. And the global energy-transition drama is playing out so very fast.

The next day, in my second presentation, I continue the theme of the first. This isn’t just about renewable supply, I say, its about battery storage and electric vehicles. Things are moving

rapidly in every leg of this trio. Take the events of the recent week. On 5th July the first major carmaker [called](#) time on internal-combustion-engine-only cars. Volvo will use electric motors in all cars from 2019. The next day, Bloomberg's annual prediction of electric vehicle growth significantly [exceeded](#) last year's estimate: EVs will be cheaper than conventional cars in most countries by 2020-2025, and by 2040, 54% of new vehicles & 33% of all light vehicles on roads will be EVs. The same day France [announced](#) a plan to ban sales of petrol and diesel cars by 2040. That would have sounded radical a year ago. Now, Tony Seba suggests that it is actually irrelevant: there won't be any petrol and diesel cars left to ban by 2040.

Meanwhile, in breathtaking contrast, the oil majors are arguing that the vast majority of global primary energy will still be coming from fossil-fuels at that time. Good luck with that, in the face of the daily news about renewable energy and electric vehicles.

Where does the developing world sit in my tide of bullishness about a clean energy future, I ask?

And so to The Test.

I make the basic case, and repeat the question that frustrates me so much. How can it be that, collectively, we are missing such an open goal?

I am sure that the reasons are multi-faceted. But there is one simple over-arching answer. None of us are trying hard enough. Not governments, not companies, not international organisations, not non-governmental organisations.

In this respect, I observe, the Expo has a plan for real-life projects to follow up the theme of the event. I have one for the organisers to consider, I say. Help SolarAid in our quest. Let's together figure out a way to play a lead role in eradication of the kerosene lamp. What a great way to cement the legacy of the Expo.

An ambitious notion is beginning to take shape in my mind, triggered in part by my experience in the Albert Hall a week ago. Sitting in that hall, that night, were companies and organisations that could eradicate the kerosene lamp from the world within a matter of years, if they chose to work together with seriousness of intent. There were plenty not present who could add considerable fuel to such a campaign. It seems clear to me now what SolarAid should do in the next few years. We should try to work with enough of those companies and organisations, in clever enough ways, that we play a useful role - maybe a catalytic role, if we can - in ensuring that civilisation passes The Test.

Next week I leave for Africa, and a tour of SolarAid's front line nations. I will learn much on that trip that I can't glean from an armchair in London. After it, I am hoping a plan will take shape.