



## Perspective

# Vouchers can create a thriving market for distributed power generation in developing countries<sup>☆</sup>



Johannes Urpelainen

Johns Hopkins School of Advanced International Studies (SAIS), United States

## ARTICLE INFO

## Keywords:

Rural electrification  
Solar power  
Distributed energy  
Energy access  
Energy policy

## ABSTRACT

I propose that vouchers offer a promising approach to making distributed power generation, such as solar home systems, affordable to consumers and profitable for producers and distributors. In a voucher-based system, governments give vouchers to eligible beneficiaries, who then use the vouchers to purchase qualifying products and services. This system enables consumer choice, helps the poor with the affordability of distributed energy products, and injects money into the market for relevant products and services. I discuss practical implementation challenges and argue that digitalization allows governments to significantly reduce corruption and red tape, making vouchers a realistic energy access policy for many governments all over the world.

## 1. Introduction

Global progress in rural electrification has been impressive over the past decade, but the challenge of providing another billion people with domestic electricity in the coming decades remains massive. One reason for optimism is the decreasing cost of distributed power sources (Alstone et al. [13]). Over time, the decreasing cost of solar panels in particular has created new opportunities for distributed power generation [1]. Solar home systems, micro-grids, and mini-grids thus promise to play an important role in rural electrification in the future.

If distributed power generation is to play an important role in rural electrification, then governments must find policy models that allow the sector to grow rapidly [2]. Achieving this goal requires striking the right balance between affordability and profitability of distributed power. On the one hand, non-electrified households tend to be rural and poor, and thus often unable to pay for expensive products and services. On the other hand, entrepreneurs will not invest in distributed power generation unless they expect a reasonable return for their capital. Bridging this gap between rural poverty and finance requires policies that both help the rural poor gain access to distributed power solutions and create profitable opportunities for private entrepreneurs. Over time, such policies can create a market for distributed power generation.

Here I argue that *vouchers* offer a highly promising solution to the dual problem of affordability and profitability. A voucher is essentially a subsidy targeted at the consumer. The consumer can use the voucher to purchase select goods and services, as the government commits to giving money to the seller in exchange of the voucher. Examples of

common vouchers include meal vouchers, school vouchers, and food stamps. In the case of distributed power generation, consumers could use vouchers to pay for installing or leasing solar home systems, as well as for purchasing solar lanterns or subscribing to a micro-grid service.

As I shall demonstrate, the benefits of vouchers can be easily seen by comparing them with both conventional production subsidies and unconditional cash transfers. While conventional production subsidies do reduce the cost of new products and services, they do not allow the government to choose an exact sum of money that is injected into creating a distributed power generation market. Production subsidies can be both insufficient and wasteful, as producers may respond in unexpected ways. Vouchers, on the other hand, allow governments to choose the exact amount of total support and target it to households in need, such as the rural poor. Vouchers also maximize consumer choice as long as governments allow a wide range of voucher-eligible products and services.

The practical implementation of vouchers presents a host of challenges, and the final part of this article offers concrete solutions to them. I explain how digitalization and prudent policy design can help governments deal with corruption, delays, and other obstacles to the use of vouchers.

Globally, the potential for voucher-based models is significant. In the New Policies Scenario of the International Energy Agency [3], about 300 million people will obtain electricity at home through off-grid or mini-grid connections. Given the rapid progress in grid extension in South Asia, most of these people will be in Sub-Saharan Africa. If a few of the larger Sub-Saharan African countries – Ethiopia, Kenya, Nigeria, and Tanzania – were to implement a voucher-based model, almost two

<sup>☆</sup> I thank Rustam Sengupta and Patrick Bayer for excellent comments on a previous draft and Siyuan Ma for research assistance.

hundred million people living in rural areas without electricity would benefit from greater consumer choice and a more vibrant energy access market.<sup>1</sup>

## 2. Distributed power generation: the problem of affordability

Although distributed power generation promises to increase the speed of rural electrification by offering an alternative to grid extension, the *affordability* of off-grid solar power remains a high barrier to progress [4–6]. Similar to grid electricity, using off-grid solar power requires financial investments: solar lanterns and home systems are products that have to be either purchased or leased, and subscribing to a micro-grid service requires regular payments. Because the remaining non-electrified households are mostly poor, affordability presents a pressing challenge to the success of distributed power generation.

Recognizing the problem of affordability, many governments have offered subsidies to off-grid solar power. The standard subsidy model is based on a percentage of cost paid by the government. For example, a government could agree to pay a producer 50% of the total cost of a solar home system. Similar, the government could pay a microgrid installer 50% of the total cost of installing a system. The government would set certain requirements for systems that qualify for subsidy. These could include the retail price and meeting quality standards in testing done at a national laboratory.

In India, the government of Prime Minister Manmohan Singh offered a 40% capital subsidy to small solar home systems. From March 2012 to March 2015, the National Bank for Rural Agriculture and Rural Development (NABARD) offered this subsidy for solar photovoltaic systems approved by the Ministry of New and Renewable Energy.<sup>2</sup> Only small systems with a maximum capacity of 210 W qualified. This system required that consumers submit quotations and other documentation, and the subsidy was only available for consumers who also took a loan from NABARD.

In Myanmar, a project funded by the Asian Development Bank gave a 100% subsidy and gave households free solar home systems [7]. With the operation of Department of Rural Development (DRD), an off-grid lighting program gave away solar home systems to end users with a 100% subsidy. The scheme supported 17,616 solar home systems in 2013, 18,342 in 2014 and 179,163 in 2015, as well as over one hundred mini-grids during the same period.

The problems with these subsidy models are twofold. First, subsidy models give the government little control over how much money is injected into the distributed power markets, as the ultimate production decisions remain with producers. Subsidies can be too generous, so that huge amounts of money are lost in supporting products that would have been manufactured in any case. Subsidies can also be too little to encourage production or reduce prices. Second, subsidy models are prone to bureaucratic red tape and corruption, as producers must first make a production decision and then apply for the subsidy. The paperwork required to obtain a subsidy can deter producers from acting if they worry about the government's trustworthiness and ability to pay on time. Finally, as subsidies are typically given to specific products, they do not allow entrepreneurs flexibility in meeting their customers' variegated demands and preferences.

Here I propose that *off-grid solar power vouchers* can solve many of the problems associated with the subsidy model. If governments can create a voucher-based system, they can overcome many of the problems associated with conventional production subsidies and thus

<sup>1</sup> According to Ma and Urpelainen [1], the number of people living in rural areas without electricity was 69 million in Ethiopia, 30 million in Kenya, 56 million in Nigeria, and 35 million in Tanzania. The total potential in these four countries alone is thus 190 million people.

<sup>2</sup> <https://www.bijlibachao.com/solar/procedure-to-get-subsidy-on-solar-pv-systems-through-nabard-in-india.html>.

contribute to the global quest for sustainable energy for all.

## 3. Vouchers as a solution

To see how vouchers can contribute to the rapid adoption of off-grid solar power, I first offer an intuitive account of the simple economics of vouchers, then apply the economic principles to the case of distributed power generation, and finally demonstrate the value of vouchers by comparing them to two primary alternatives: conventional production subsidies and unconditional cash transfers.

### 3.1. Economics of vouchers

The basic idea behind vouchers is simple. A government agency hands out vouchers to eligible beneficiaries. Each voucher is worth a certain amount of money but can only be used to purchase qualifying products and services. When a vendor sells such as product or service, he or she can exchange the voucher for money through the government agency. In a digital system, this exchange can be done online if the voucher has a unique identifier.

Vouchers have a number of appealing properties. Most importantly, they allow a combination of targeting and consumer choice. The government can choose who receives the vouchers based on criteria such as income, ethnicity, location, and gender. The government can also encourage consumer choice – and, therefore, market competition by producers – by allowing a wide range of products and services on the list of qualifying purchases. As long as the government sets and announces transparent criteria for qualifying products and services, and resists the temptation to let producers with political clout dictate the eligible list, consumer choice is maximized.

Schooling is perhaps the best example of vouchers in actual public policy ([8]: 11). If the government is concerned about the quality of public schools and wants to introduce competition, it can give vouchers to parents of school-age children. The parents can use the vouchers to pay for public education, but they can also choose a private alternative. This system allows the government to offer public education but also have private alternatives, while continuing to make education affordable to children from poor households. If the system succeeds, overall quality of education improves because of competition, private sector innovation, and flexibility in meeting the needs of different families and, most importantly, their children.

### 3.2. Vouchers for distributed power generation

In distributed power generation, vouchers would be given to citizens for purchases of qualifying off-grid solar power technologies or services. The government would decide on the characteristics of households that qualify for vouchers, and then distribute the vouchers to them through channels such as the postal service or, where possible, electronic delivery. Each voucher would have an electronic identifier and be linked to a unique person in the household, so as to minimize the risk of “leakage,” that is, households selling the vouchers to others. Through digitalization, the government would keep track of vouchers spent and still in circulation. Transparent digital records would also reduce corruption, leakage, and political targeting of benefits.

The key difference between vouchers and conventional subsidies is that while vouchers are given to *consumers*, subsidies are given to *producers*. The producers and distributors of off-grid solar technology, be it products or services, would only gain from the vouchers after consumers used them to make purchases. Therefore, vouchers would not create a risk of overproduction of goods and services that consumers do not want to use.

Vouchers, clearly, would contribute toward solving the affordability problem. They would inject money into the distributed power generation market through consumers. This amount of money would be precisely quantifiable in advance, as the government could choose any the

Download English Version:

<https://daneshyari.com/en/article/6557044>

Download Persian Version:

<https://daneshyari.com/article/6557044>

[Daneshyari.com](https://daneshyari.com)