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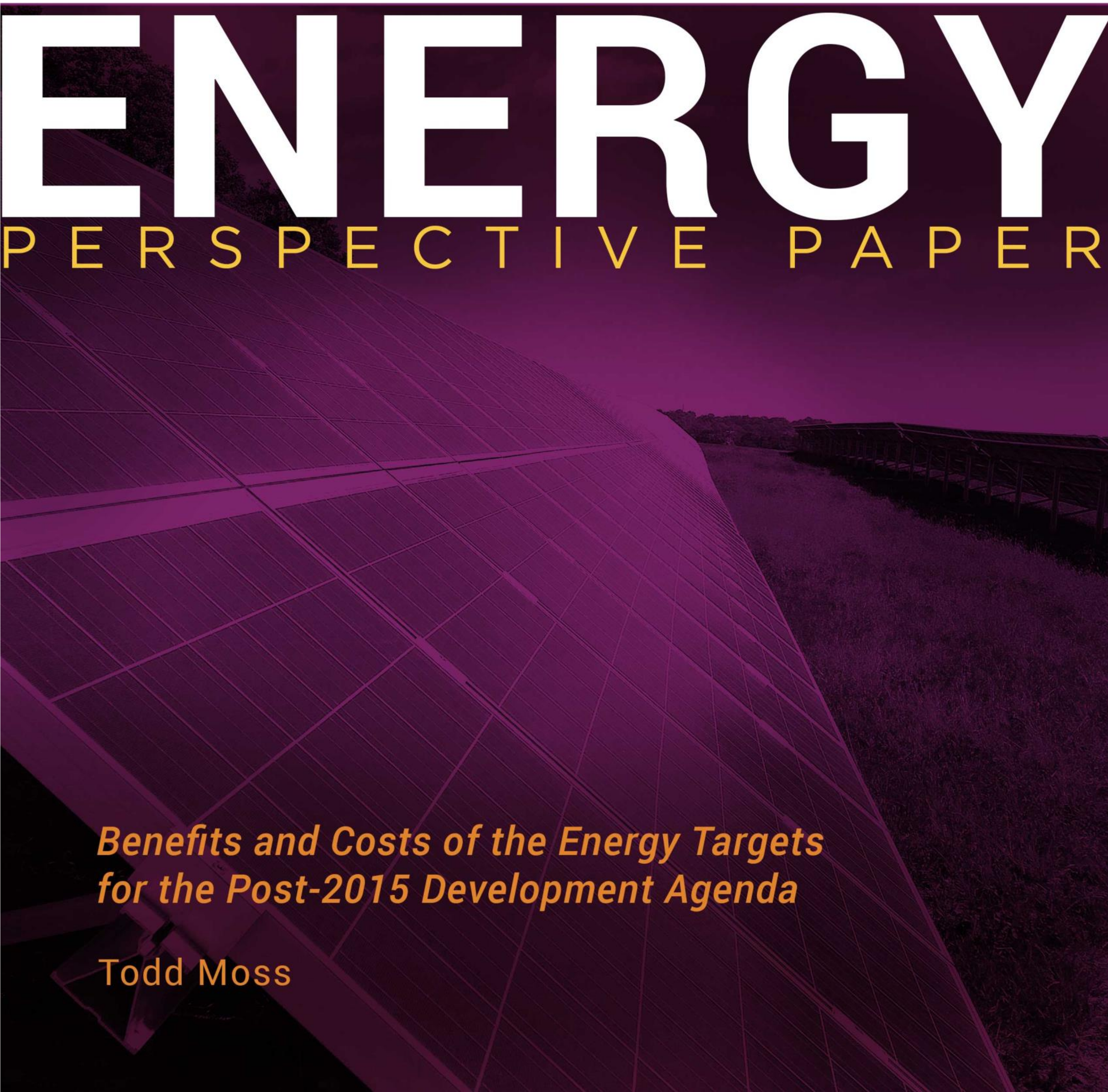

ENERGY

PERSPECTIVE PAPER

Benefits and Costs of the Energy Targets for the Post-2015 Development Agenda

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Post-2015 Consensus

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Energy access is a vital development goal

The invigorated focus on energy on the development agenda is a positive step reflecting what governments, business leaders, and citizens across the developing world agree: increasing access to energy is a top priority and central to solving other challenges in health, education, and job creation. National development priorities and the investment portfolios of multilateral and bilateral agencies are all shifting to respond to growing energy demand. The first set of Millennium Development Goals (MDGs) acknowledged energy's role in development, but left energy access as an implicit step toward reaching other targets. Arguably, this has not produced the clear attention and investment needed to accelerate the closing of the yawning gap in energy consumption. The IEA estimates that some 1.3 billion people still do not meet a minimum energy use threshold, while per capita consumption in countries like Tanzania, Ethiopia, and Liberia is less than 1% of the levels in the United States. The UN's High-Level Panel which makes recommendations for the next round of post-2015 goals has proclaimed that "a new agenda will need to set out the core elements of sustainable lifestyles that can work for all."[1] A draft list of Sustainable Development Goals more specifically proposes Goal 7 should be to "ensure access to affordable, reliable, sustainable, and modern energy for all."[2]

But meaningful targets are less clear

An explicit energy goal is welcome. Energy access is necessary for improved cooking, heating, lighting, refrigeration, communications and more that are all directly related to important health, education, and income goals. And, quite simply, it makes life easier, more pleasant, and more dignified. However, success for any broad goal requires setting the right specific target with which to measure progress. While there is general agreement on the need for universal access to electricity, determining what specifically constitutes "modern access" is a more disputed task. Unlike standardized measures with a 0-1 answer like infant mortality or primary school enrollment, energy access is not as simple as having a power line connected to a household. Access depends far more on how much and how reliably electricity flows through that line and at what cost. (And it depends on other potential non-electricity energy sources, such as gas for heating or cooking.) Modern energy access thus entails less a physical connection than the availability of reliable and affordable power necessary to sustain a dignified lifestyle, one that is consistently free from depravation and intimately connected with the global community. Current definitions almost all far understate the amount of electricity and energy services that a growing class of the world's poor expect and demand.

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[1]UN (2013). "A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development" Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda. http://www.post2015hlp.org/wp-content/uploads/2013/05/UN-Report.pdf

[2] UN Open Working Group on Sustainable Development Goals (2014). "Outcome Document." http://sustainabledevelopment.un.org/focussdgs.html

IEA thresholds are the standard

The International Energy Agency (IEA) is the most widely recognized standard for energy access thresholds. According to the IEA definition, a household is considered to have "modern electricity access" at a consumption minimum of 250 kWh per year (or roughly 50 kWh/person/year) in rural areas and 500 kWh per year (100 kWh/person/year) in urban areas. The IEA recognizes this as an initial threshold level, with consumption eventually growing to 750 kWh/household/year by 2030 as households gradually acquire more energy-intensive assets.

Table 1: Global Energy Access

	Electricity consumption (kWh/cap/yr)	Access to electricity (% of population)	Pop w/o electricity (millions)
United States	13,395	100%	0.0
Europe avg.	7,062	100%	0.1
South Africa	4,654	85%	7.6
China	2,944	100%	4.0
Tunisia	1,350	100%	0.1
India	641	75%	297.8
Ghana	299	72%	6.8
Kenya	155	19%	33.1
Nigeria	135	48%	83.0
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IEA urban threshold	*100*	-	-
Tanzania	91	15%	38.3
Liberia	79	0%	3.9
Ethiopia	51	23%	66.8

But the current IEA targets are obviously far too low

These levels of energy consumption are indefensible as "modern energy access." An average of 100 kWh/year equates with powering a single 60 watt light bulb for five hours per day for a year. This is closer to a definition of energy poverty than anything remotely close to a modern or dignified standard of living. The gaps are especially stark when compared to common western lifestyles, where an average American would consume 100 kWh in about three days. Further, such levels do not capture the vast unmet current demand among existing consumers, as evidenced by ubiquitous rolling blackouts and widespread diesel generator use.

We need more reasonable and dignified energy access targets

Any meaningful energy access goals must reflect both this latent demand for modern energy and an allowance for future growth to that level. And because the push for energy access involves major infrastructure investments, aiming too low has potentially dire consequences. An "ambition gap" in access targets threatens to waste an opportunity to build an energy system that will power the kind of development we hope to see and which countries also expect of themselves.[3] We propose three possible alternative ways to set thresholds that would capture a more realistic level of consumption at modern levels and provide a better target:

1. ***A simple peer-level threshold:*** Any flat consumption level has limitations, particularly in capturing the dynamic nature of electricity and the variation across household types and stages of development. However, simple thresholds are easy to understand and can be easily extrapolated from existing models used by the IEA and others. Setting possible targets based on average consumption levels in middle-income countries—for instance Tunisia or South Africa—offer potential target levels that are closer to a modern standard of living. Instead of targeting an arbitrary 50 or 100kWh/person/year, the standard could be set to bring energy-poor countries up to a level with their peers: Tunisia's 1,300 kWh/person/year or South Africa's 4,600 kWh/person/year.

2. ***The World Bank's Tier 4:*** The World Bank's Global Tracking Framework, a component of its Sustainable Energy for All initiative, has made important strides in measuring access to energy in a more practical and meaningful way. Their 5-tier system is based on energy services, not electricity consumption for its own sake, with each tier allowing for operation of increasingly energy-intensive appliances. Thanks to the Bank's prominent role in providing global public data, this measurement system will likely prove to be a strong analytical tool. But if it is to be a tractable global access target, it needs to be translated into simpler terms that governments and citizens can easily grasp. One approach could set the global goal for all citizens to have reliable, affordable, and safe energy for household use and cooking by 2030—which is at minimum Tier 4. Countries already at Tier 4 could aim to reach Tier 5. While such a target is abstract, the World Bank or another standard-setting body could also impute energy consumption estimates at each level.

[3] Bazilian, Morgan, and Roger Pielke. "Making Energy Access Meaningful." Issues in Science and Technology, no. Summer (2013). http://sciencepolicy.colorado.edu/admin/publication_files/2013.22.pdf.

Table 2: World Bank multi-tier matrix of energy access

Attributes of energy supply		Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Capacity	Household electricity	No electricity[a]	Very low power	Low power	Medium power	High power	
	Household cooking	Inadequate capacity of the primary cooking solution				Adequate capacity of the primary cooking solution	
Duration and availability	Household electricity	<4 hours	4–8 hours		8–16 hours	16–22 hours	>22 hours
	Household cooking	Inadequate availability of the primary cooking solution				Adequate availability of the primary cooking solution	
Reliability	Household electricity	Unreliable energy supply				Reliable energy supply	
Quality	Household electricity/cooking	Poor quality of energy supply			Good quality of energy supply		
Affordability	Household electricity	Unaffordable energy supply		Affordable energy supply			
	Household cooking	Unaffordable energy supply				Affordable energy supply	
Legality	Household electricity	Illegal energy supply			Legal energy supply		
Convenience	Household cooking	Time and effort spent sourcing energy cause inconvenience			Time and effort spent sourcing energy do not cause inconvenience		
Health and safety	Household electricity	Unhealthy and unsafe energy system				Healthy and safe energy system	
	Household cooking[b]	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5

Source: World Bank/ESMAP (forthcoming 2014).

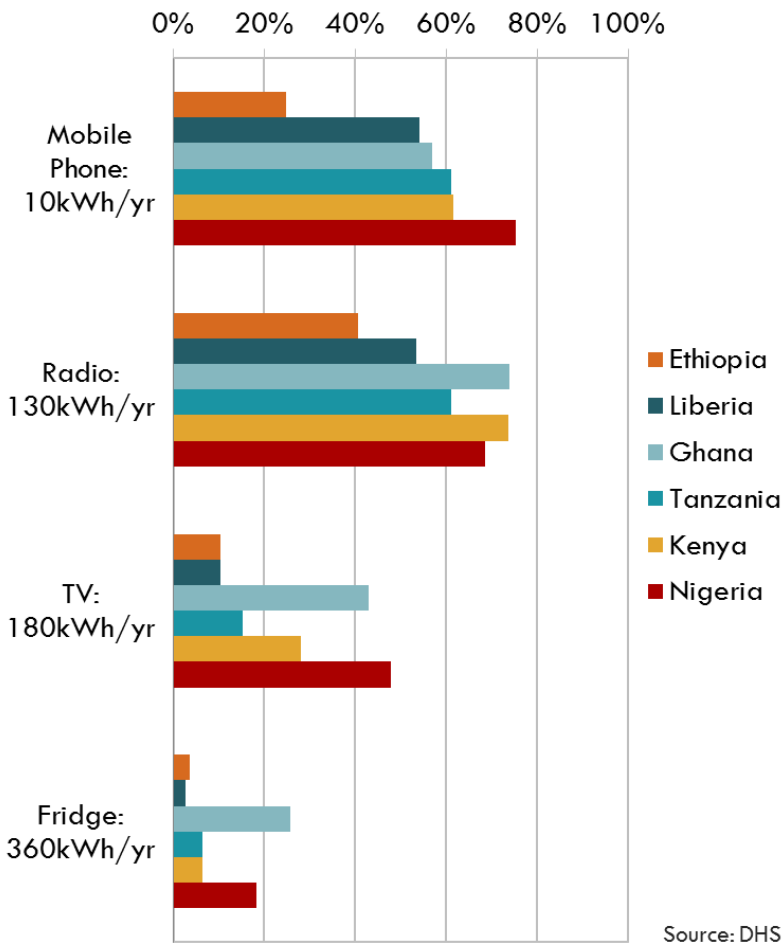
a. The detailed multi-tier matrix for household electricity considers a continuous variable between tier 0 and tier 1 for basic lighting services so as to capture the contribution of solar lamps that do not reach the minimum output threshold required for tier 1 access but that are highly affordable and enable households to reduce or eliminate the use of kerosene for lighting.

b. Levels are defined based on the technical performance of the cookstove (for example, in terms of efficiency, pollution, and safety), kitchen ventilation, and conformity of usage (use of required accessories, regular cleaning, and so on.)

1. ***"Daily energy requirement" estimate****:* Similar to the model used to estimate daily required nutrition or caloric intake, an energy access goal could be based on the energy required for a basket of fundamental services needed to sustain modern life. The nutrition model is dependent on both biological needs and the demographic characteristics and activities of the individual, and estimates the amount of calories a person needs to consume each day. The same type estimation could be made for the amount of electricity required to power activities of an individual's modern lifestyle. The most recent DHS data identify at least four common energy-intensive assets (radio, TV, refrigerator, and mobile phone) that citizens own and would use on a daily basis (See Figure 1 for asset ownership in the six Power Africa focus countries, and plausible energy consumption required for each). Matching these with estimates of the yearly energy consumption, along with standard household lighting and other common appliances could yield a minimum consumption threshold. As countries grow and household incomes increase, they acquire more assets and require more energy.[4] Since definitions of common assets or what constitutes a dignified modern life are more subjective than biological human needs, some reasonable assumptions would have to be made by a credible body.

[4] Wolfram, Catherine, Orie Shelef, and Paul J. Gertler. How Will Energy Demand Develop in the Developing World?. Working Paper. National Bureau of Economic Research, January 2012. http://www.nber.org/papers/w17747.

Fig. 1: Energy-intensive asset ownership



We can do much better for the world's poor

Whether reaching the current IEA threshold or any of these proposed alternatives are achievable universally by 2030, and at what cost, is beyond the scope of this brief note. Our purpose is to affirm that access to affordable, safe, and clean energy is a worthwhile goal and potentially a post-2015 global development goal. Electricity's central and multidimensional role in building the kind of dignified, modern lifestyles we hope for all people requires that we approach it with realism as well as idealism. Setting a reasonable target matters, because "the sorts of policies that would make sense to get large numbers of people over a low and arbitrary threshold are very different from those that will underpin sustained growth in economies and consumption."[5] While the nature of energy access, services, and consumption makes estimating these targets complex, we are failing the world's poor if we underestimate true demand and collectively do not aim for a brighter, fully-powered future.

[5] Bazilian and Pielke, "Making Energy Access Meaningful."

This paper was written by Todd Moss, Chief Operating Officer and Senior Fellow and Madeleine Gleave, Research Assistant at the Center for Global Development. The project brings together more than 50 top economists, NGOs, international agencies and businesses to identify the goals with the greatest benefit-to-cost ratio for the next set of UN development goals.

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