Development incentives for fossil fuel subsidy reform

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Reforming fossil fuel subsidies could free enough funds to finance universal access to water, sanitation, and electricity in many countries, as well as helping to cut global greenhouse gas emissions

Fossil fuel subsidies are not only economically inefficient, but also harmful for the environment[1–3]. In 2011 fossil fuel consumption received subsidies of about US$ 550 bn per year globally[4]. According to Davis[5], oil subsidies alone account for economic inefficiencies (i.e. annual deadweight losses) of about US$ 44 bn. At the same time, reducing fossil fuel subsidies would help to protect the climate[6]. Estimates by the IEA[7] indicate that a universal phase-out of fossil fuel subsidies would lower annual global CO_2 emissions by 4.4%. From this perspective, reducing or even removing such subsidies seems to be a no-regret option[8]. However, substantial fossil fuel subsidies are observed in many countries, mostly targeted on oil and petroleum products or electricity consumption.

A common explanation for the prevalence of these subsidies lies in political economy motives[9]. Even though low-income groups derive comparatively low benefits from fossil fuel subsidies[10], there is nevertheless considerable opposition to subsidy removal[11], as the resulting rise in energy prices may worsen the situation of the poorest part of the population[12]. For this reason, several policies to make subsidy reform 'pro-poor' have been proposed. These include direct cash transfers (Iran and Georgia)

and strengthening social safety nets (Indonesia, Jordan and Moldova) to compensate affected parties for their increased spending on energy[13,14].

This Commentary examines what human development benefits could be achieved if these subsidies were redirected to spending on public infrastructure. It puts into perspective the amount of fossil fuel subsidies currently deployed in relation to the financial means required to provide access to basic services, in particular water, sanitation, electricity, telecommunication and paved roads. For these services, access gaps are most severe in Africa and South Asia, but also for some low-income countries in Latin America (see Table 1). For instance, in Sub-Saharan Africa more than two thirds of the population lacks access to sanitation and electricity. Linking fossil fuel subsidy reform to infrastructure investments could hence not only promote environmental integrity, but also human development. In this way, it could successfully address one of the main obstacles to subsidy reform, namely the concern of adverse development outcomes.

[Table 1: access to infrastructures, regional aggregation]

In the following, we examine a scenario in which infrastructure investments are undertaken over a horizon of 15 years, corresponding to the 2015-2030 timeframe of the process to extend the Millennium Development Goals. We assume that without intervention, the share of the population lacking access to a certain infrastructure in the year 2030 would be the same as in the year 2010 (hence our estimates can be considered conservative, as with economic growth it can be expected that access gaps start to shrink as part of the economy's development process and a lower share of fossil fuel subsides as the one indicated in our analysis would be needed to achieve universal access). The access gap for each country is then projected by multiplying this share with the population forecast for 2030 (see SI for details).

Our cost calculations indicate that universal access to water for all people on the planet could be achieved by investing US$ 190 bn, US$ 370 bn could cover universal access to sanitation, and US$ 430 bn could finance universal access to electricity. If spread over a horizon of 15 years, these amounts are only a small fraction of the US$ 8.2 trn of fossil fuel subsidies that would globally occur over this period, assuming they remain at their year 2011 level. However, more ambitious projects, such as providing universal access to telecommunication (US$ 2.6 trn) or paving all unpaved roads (US$ 8.7 trn) could take up a large share of (or even exceed) the amount of finance that can be levied by fossil fuel subsidy reform.

Figure 2 displays the share of fossil fuel subsidies that would need to be invested in a particular infrastructure over the period 2015-2030 to achieve universal access at the country level. Whereas a lighter color indicates that a lower share of current subsidies would be sufficient to meet infrastructure investment needs, light blue indicates shares in excess of one (i.e. investment needs exceed subsidies), and grey areas indicate countries for which no data are available. We only examine the case in which subsidies are redirected at the national level, i.e. no redistribution across countries takes place (which does not seem politically feasible).

[Figure 2: Maps of shares for different infrastructures]

These results show that for the majority of countries in our sample, phasing out fossil fuel subsidies would free enough funds to finance universal access to water, sanitation, and electricity. For instance, for Nigeria only slightly above 60% of the population have access to water. Even though fossil fuel subsidies for this country (US$ 7.3 bn) are considerably lower than for other countries in our sample (but among the highest in Africa), a fraction of less than 4% would be sufficient to provide water for the entire population (panel a). However, for China, almost half of its fossil fuel subsides (of US$ 9.8 bn per year) would be required, and for some countries, such as the Democratic

Republic of Congo, Honduras, or Papua New Guinea, they would not be sufficient to cover investment needs. For sanitation, we find a similar picture (panel b). For instance, in Indonesia and Bangladesh, less than 60% of the population has access to improved sanitation, and about 47% in Pakistan and 34% in India. At the same time, in 2011 these countries had fossil fuel subsidies of between roughly US$ 6 bn and US$ 30 bn. According to our estimates, investing a share of between 2% (Indonesia) and 18% (India) over a 15 year period would be sufficient to achieve universal access to sanitation in these countries. Likewise, for India almost 370 million people lack access to electricity which could be provided by investments of less than 6% of this country's fossil fuel subsidies (panel c). For Bangladesh, more than 80 million people could gain electricity access for less than of 7% of current fossil fuel subsidies. For Nigeria, where more than 140 million people are without electricity, however, almost half of fossil fuel subsidies would be required. For telecommunication, even countries such as Pakistan and Sri Lanka, where only about half of the population have access to telecommunication, could achieve universal coverage by redirecting their fossil fuel subsidies accordingly (panel d). However, for others, including India and several Sub-Saharan countries, the investment requirement for telecommunication goes considerably beyond the savings that could be achieved by fossil fuel subsidy reform. Finally, while paving all unpaved roads would exceed the current level of fossil fuel subsidies for several countries and for others use up a large part of subsidy reform (panel e), it would be a feasible course of action for some countries that at the same time have high fossil fuel subsidies and already a high share of paved roads, such as Algeria, Egypt, Kazakhstan and Pakistan.

Our analysis indicates that redirecting fossil fuel subsidies to infrastructure investments could for at least some countries close a large share of current infrastructure access gaps, in addition to the indirect benefits of economic efficiency and environmental improvements. Even though many of the countries that display the highest subsidies perform comparatively well in terms of access (e.g. Saudi Arabia, Iran), and many of those with the largest access gaps have relatively low subsidies, there is an intersection of countries with high fossil fuel subsidies and large access gaps. This is particularly true

for a number of African countries (including the Republic of Congo, Zimbabwe, Zambia, Cabo Verde, Angola and Nigeria, see SI for details). Given the large human development benefits of these infrastructures[15,16], it seems likely that increased access could be sufficient to compensate for higher energy costs resulting from removal of subsidies. Nevertheless, a gradual decline of subsidies, as well as measures to begin building up infrastructure before subsidies are lowered, will need to be implemented. Otherwise, some people would be affected by higher energy prices without benefiting from increased access during the transitional period of infrastructure construction.

Highlighting the potential opportunity costs of fossil fuel subsidies – i.e. the foregone benefits that could be reaped if they were used in a different way – might strengthen the support for measures aiming to redirect these subsidies[17]. It could hence alter the political economy of fossil fuel subsidies by affecting the balance between interest groups supporting and opposing subsidy reform. As a result, linking fossil fuel subsidy reform to access considerations could turn out to be beneficial for human development as well as the environment and might even provide a viable basis for more ambitious climate change mitigation policies in the future[18]. In how far these benefits can be realized in practice arguably depends on country-specific factors, in particular the political influence of different interest groups and the possibility to form coalitions in favor of subsidy reform. Future research will be required to explore opportunities and obstacles to combine fossil fuel subsidy reform with infrastructure investment and identify countries that are likely candidates for the approach sketched in this paper.

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Figures and Tables

Region	% w/o acccess to elec.	% w/o acccess to water	% w/o acccess to sanitation	% w/o acccess to ICT	% of unpaved roads
East Asia & Pacific	4.8	8.8	30.6	29.3	40.1
Europe & Central Asia	0.0	2.0	6.5	14.2	23.1
Latin America & Caribbean	5.2	6.2	18.4	23.0	81.8
Middle East & North Africa	5.3	9.2	11.1	13.8	21.9
North America	0.0	0.8	0.1	1.1	0.0
South Asia	25.6	10.6	61.8	67.9	46.9
Sub-Saharan Africa	68.1	36.7	69.6	59.8	79.6
Global	**16.8**	**11.3**	**36.0**	**37.4**	**31.6**

Table 1: Share of population lacking access to electricity, water, sanitation, telecommunication and share of unpaved roads by region according to World Bank classification. All data are for the year 2010. Source: World Bank (2014), ITU (2014), Pachauri et al. (2013).

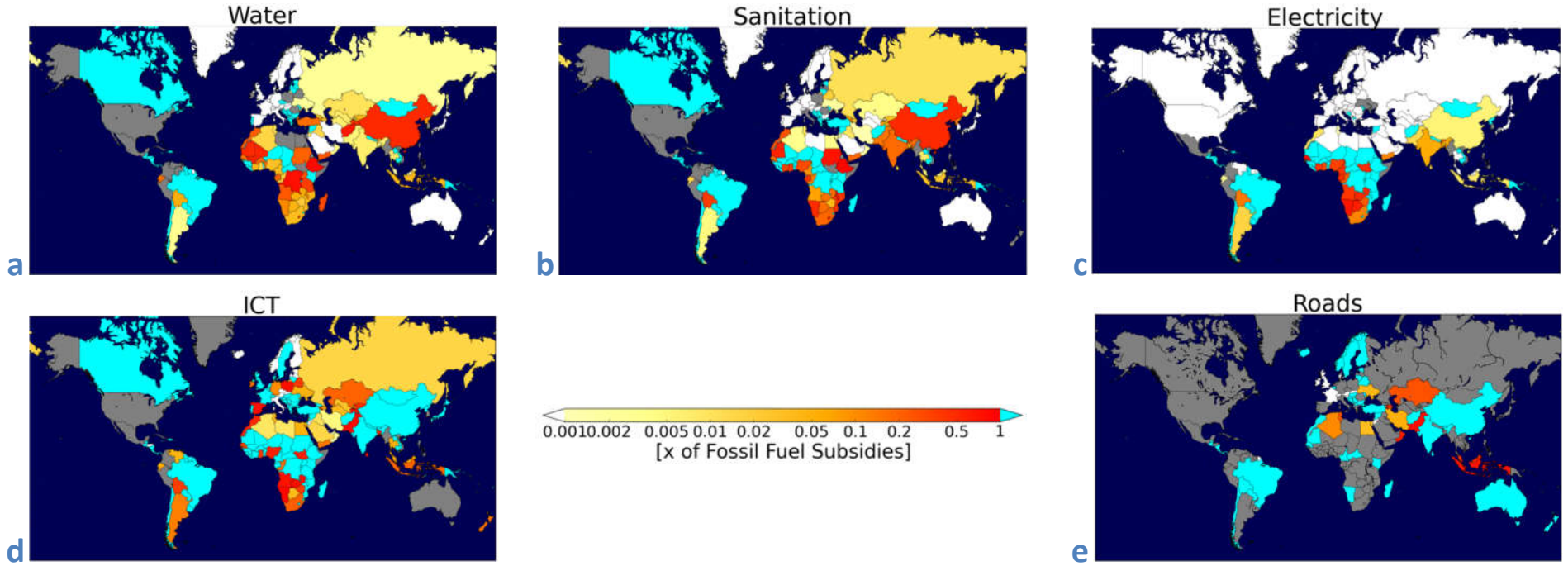

Figure 1: Potential to achieve universal access to key infrastructures by 2030 by means of fossil fuel subsidy reform, assuming that without policy intervention fossil fuel subsidies would remain at their current (that is, year 2011) level. Panels depict the share of fossil fuel subsidies required to finance universal access to (a) water, (b) sanitation, (c) electricity, (d) telecommunication, and (e) to pave all unpaved roads. Please note logarithmic scale. Grey areas indicate lack of available data.