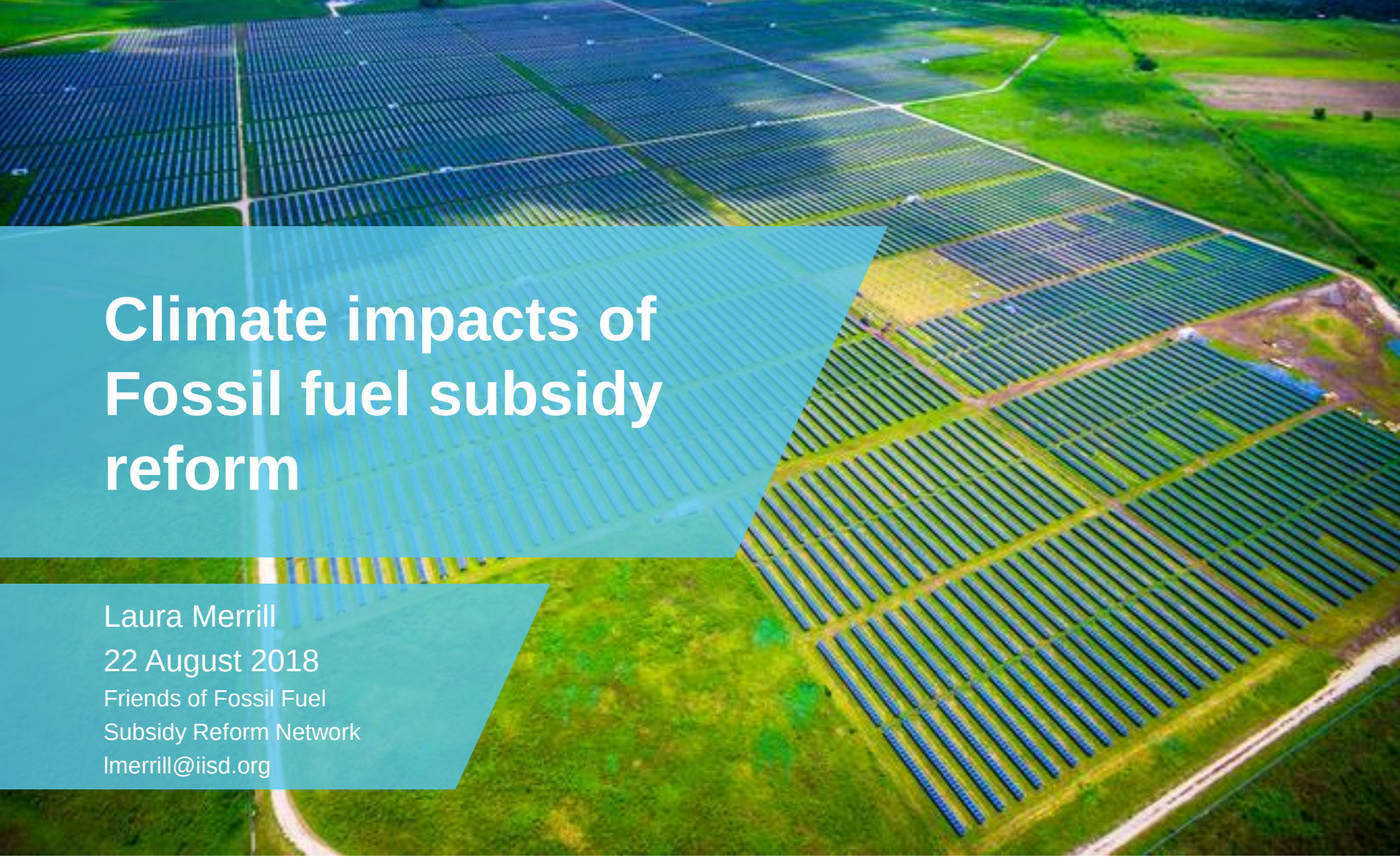

Climate impacts of Fossil fuel subsidy reform

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Global Subsidies Initiative

IISD
International Institute for Sustainable Development

Carbon *Co-benefits*

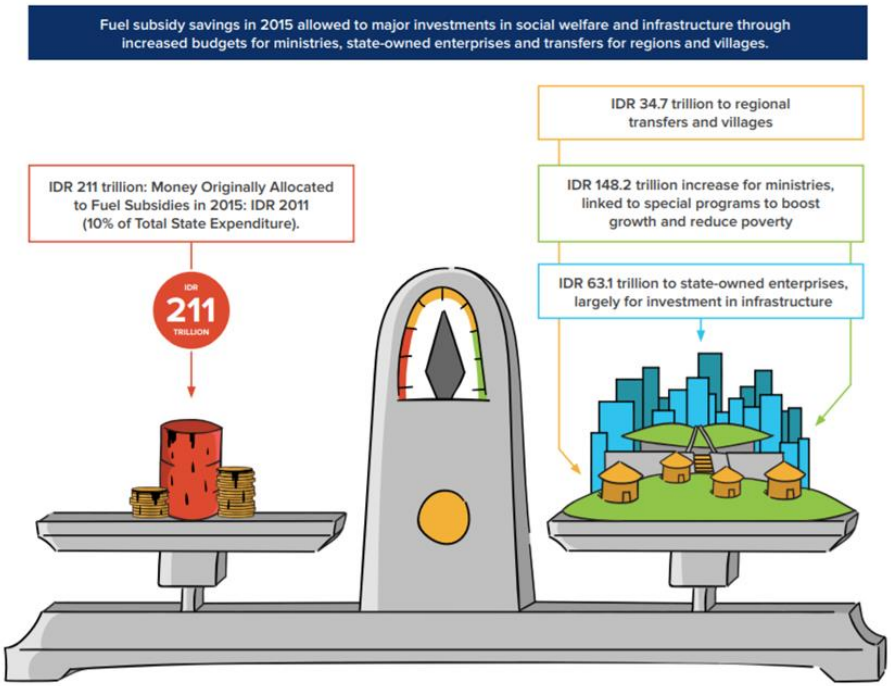


Figure ES1. Fuel Subsidy Savings and Major Increases in Expenditure in Revised State Budget 2015
Source: Authors, based on data from State Budget documents (various), Bank Indonesia[4] and IMF.[5]

Source: Pradiptyo, R., Susamto, A., Wirotomo, A., Adisasmita, A. & Beaton, C. (2015). Financing development with fossil fuel subsidies: The reallocation of Indonesia's gasoline and diesel subsidies in 2015. Winnipeg/Geneva: IISD-GSI https://www.iisd.org/sites/default/files/publications/financing-development-with-fossil-fuel-subsidies-indonesia.pdf

- CO-BENEFIT of reform can be reduction in carbon emissions
- NOT the main reason or focus for countries to undergo reforms
- BUT given the political effort to increase prices either by subsidy reform or an increase in taxation on fossil fuels countries can consider modelling emissions reductions from policy change to coordinate with energy and climate planning
- MAIN reasons for fuel subsidy reform are usually economic in terms of reducing the drain on the public purse and opportunities to use the funding more productively elsewhere e.g. Indonesia
- NEEDS a 'swap' (i.e. shift to low carbon energy) and long-term climate rules (Paris) to keep emissions down for the long-term, post reforms.

Global estimates

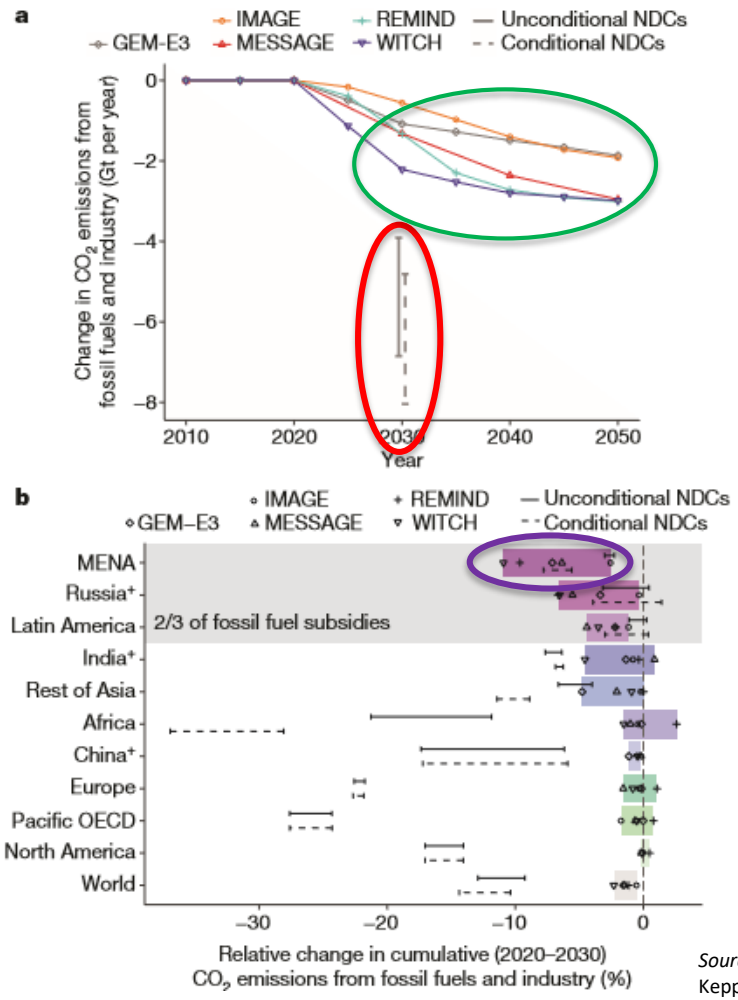
Table A1. **Emissions reductions scenarios from removal of fossil fuel consumption subsidies, existing research**

Emissions Reduction Range (from removing consumption subsidies)	Study and its main findings
Global assessments for all fuels	
5–9% and 7%	9% reduction globally assuming no change in the oil price and a 5% reduction globally assuming a change in the oil price from removal of USD 230 billion of subsidies. An equivalent reduction in carbon emissions could be achieved by an OECD carbon tax of in the order of USD 50–90 per tonne (Larson & Shaw, 1992). A 7% reduction in emissions from removal of USD 2010 billion subsidies, accounting for inter-fuel substitution. Reduction of national carbon emissions by more than 20% relative to the baseline emissions in some countries (Larson, 1994).
18.1–22.9%	An 18.1–22.9% decrease in carbon dioxide emissions based on global removal of consumer pre- and post-tax fossil fuel subsidies (Coady, Parry, Sears, & Shang, 2015).
10% by 2030 (energy sector emissions only)	A 10% reduction in energy sector emissions by 2030, from accelerating the (partial) phase-out of subsidies to fossil fuel consumption (part of the IEA's Bridge Scenario, which also includes improvements in energy efficiency [49%], limiting construction and use of least-efficient coal-fired plants [9%], minimizing methane emissions from upstream oil and gas production [15%] and renewables investment [17%]) (IEA, 2015). FFSR moderating the growth in demand as well as supporting energy efficiency, and the only end user price considered in this scenario of energy sector measures (IEA, 2014).
8.2% by 2050, 2.5% by 2020	An 8% reduction in global GHG emissions of 6.1 gigatonnes of carbon dioxide (by 2050) from a staggered removal of consumer fossil fuel subsidies based on 2008 subsidy figures. An emissions cap on OECD countries and Brazil increases the reduction to 10% (Burniaux & Chateau, 2014, Table 2, p. 16).
3% by 2020	A multilateral phase-out of energy consumption subsidies leads to 3% global GHG emission reductions at horizon 2020 relative to the baseline (Durand-Lasserve, et al., 2015, p. 53.) For a description of the OECD Environmental-Linkages Model see OECD (2016) pp. 101–105.
0.6%–2.7% by 2100 depending on the scenario	The report confirms "the short-term benefits of phasing out fossil fuel subsidies as found in prior studies. However, these benefits are only sustainable to a small extent in the long term if dedicated climate policies are weak or non-existent" (Schwanitz et al, 2014, p.882). "Over the whole time frame, until 2100 the cumulative savings range from 50.6Gt (0.6%) in the G20 phase-out scenario to 220.8 Gt (2.7%) in the scenario Zero2020" (p.886).
Country-level assessments	
Various, depending on the country	Country-specific reductions: China, a 3.72% carbon dioxide reduction between 2006 and 2010 (Lin & Ouyang, 2014); India: 1.3–1.8%, Indonesia: 5.1-9.3%, Thailand: 2.8% by 2030 (ADB, 2015); Indonesia 7.9–8.3% 2020 (Durand-Lasserve et al., 2015); Ukraine

- Different estimates depending on different scenarios and time frames, producer or consumer, oil price, usually reduction to BAU and not absolute.
- Most recent review by GSI of more than **20 studies** on emissions reduction (global and country estimates) Annex A **(**Gerasimchuk et al., 2017)
- Around **6.4–8.2 %** by 2050 (Schwanitz et al. 2014; Burniaux & Chateau, 2014) for consumer subsidies
- OECD: reform and removal of these subsidies could lead to co-benefits of global emissions reductions of around 3 per cent by 2020, rising to around **8 per cent by 2050** (Durand-Lasserve,et al., 2015; Burniaux & Chateau, 2014).
- IEA (2015): found **10 per cent reduction in energy sector emissions by 2030**, from accelerating the **partial** phase-out of subsidies to fossil fuel consumption.
- **37Gt of savings by 2050 (**Gerasimchuk et al., 2017) for production subsidies (only) (equivalent to aviation emissions)

Sources: Gerasimchuk, I., Bassi, A. M., Ordonez, C. D., Doukas, A., Merrill, L., & Whitley, S. (2017). Zombie energy: Climate benefits of ending subsidies to fossil fuel production. Geneva & London: IISD & ODI. Retrieved from http://www.iisd.org/library/zombie-energy-climate-benefits-ending-subsidies-fossil-fuel-production ; Schwanitz, V.J., Piontek, F., Bertram, C., & Luderer, G. (2014). Long-term climate policy implications of phasing out fossil fuel subsidies, Energy Policy, 67, 882 –894 ; Burniaux, J. & Chateau, J. (2014, December). Greenhouse gases mitigation potential and economic efficiency of phasing out fossil fuel subsidies. International Economics, 140, 71 –88. http://dx.doi.org/10.1016/j.inteco.2014.05.002 ; Durand-Lasserve, O., Campagnolo, L., Chateau, J., & Dellink, R. (2015). Modelling of distributional impacts of energy subsidy reforms: An illustration with Indonesia (OECD Environment Working Paper, No. 86). OECD Publishing. http://dx.doi.org/10.1787/5js4k0scrqq5-en ; International Energy Agency. (2015). Energy and climate change (World energy outlook special report). Paris. https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf

Global estimates

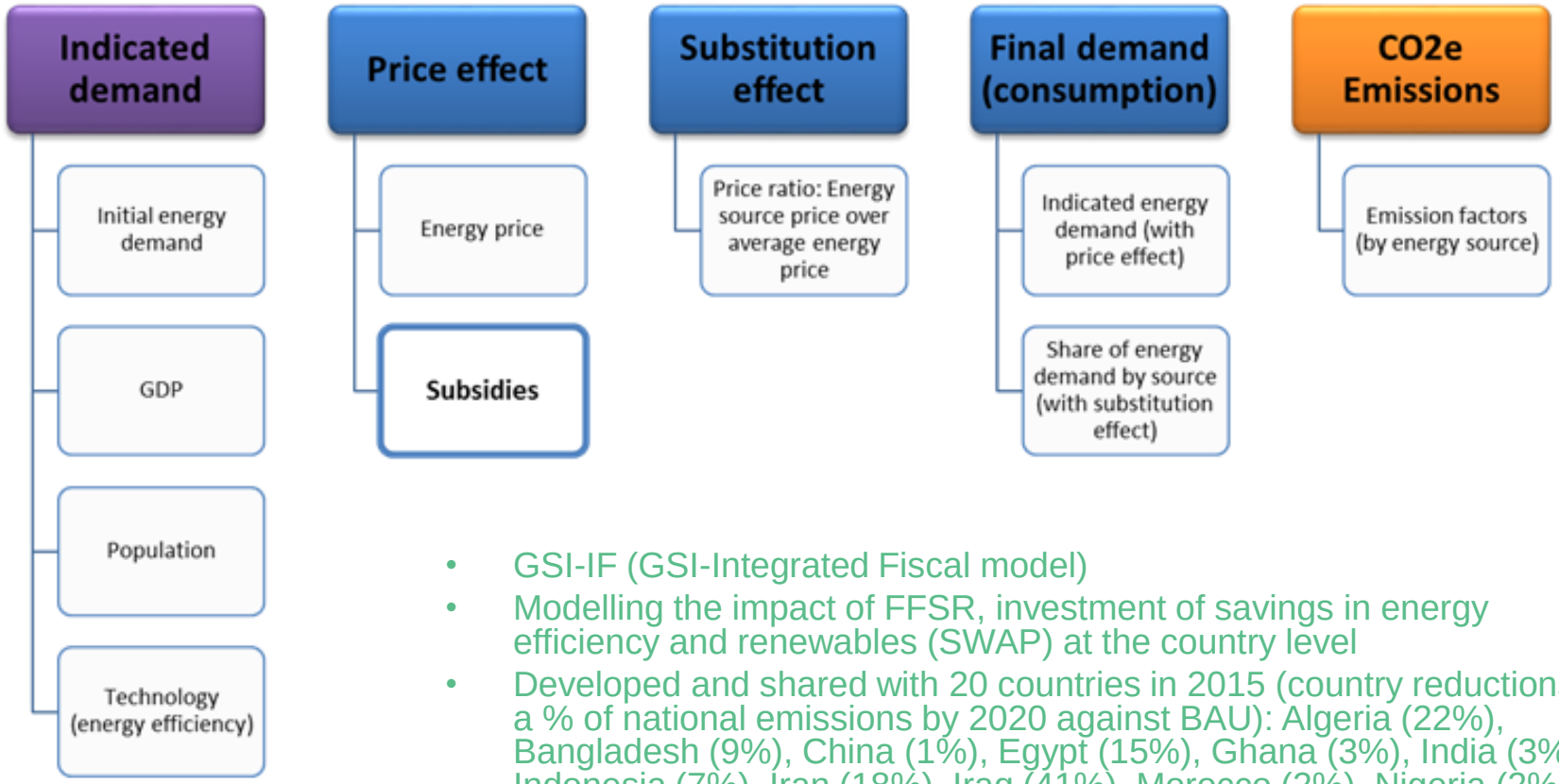


- A quarter of the combined effort currently proposed by countries as part of the Paris Agreement of between 4-8 Gt from fossil fuels and industry.
- Regions with larger subsidies mean reforms would have greater emissions reductions i.e. MENA
- 0.5 to 2 Gt or between 1-4% globally by 2030
- GSI research from 2015 found that only 9% of NDCs actually include mention of FFSR
- Opportunity to include this tool within NDCs as a co-benefit?

Figure 3 | Global and regional impact of subsidy removal and NDCs on CO_2 emissions from fossil fuels and industry under low oil prices. **a**, The impact of subsidy removal on global annual emissions compared to each model's baseline. **b**, The impact of subsidy removal on cumulative change in emissions from 2020 to 2030 at the regional level (coloured bars). Solid lines represent emission effects of unconditional NDCs and dashed lines of conditional NDCs—both modelled in MESSAGE[29]. The uncertainty ranges for these effects arise from different historical emission inventories, alternative accounting, attribution of non-commercial biomass and uncertainties in the formulations of NDCs (Supplementary Methods, Supplementary Table 15; ref. 29). See Supplementary Fig. 6 for high-oil-price scenarios and Supplementary Fig. 5 for global relative changes and regional absolute changes.

Sources: Jewell, J., McCollum, D., Emmerling, J., Bertram, C., Gernaat, D., Krey, V., Paroussos L., Berger, L., Fragkiadakis, K., Keppo, I., Saadi, N., Tavoni, M., van Vuuren, D., Vinichenko V., & Riahi, K. (2018) Limited emissions reductions from fuel subsidy removal expect in energy exporting regions Nature volume 554, pages 229-233 (08 February 2018). Available from https://www.nature.com/articles/nature25467; Terton, A., Gass, P., Merrill, L., Wagner, A., & Meyer, E. (2015). Fiscal Instruments in INDCs: How countries are looking to fiscal policies to support INDC implementation. Winnipeg/Geneva: IISD/GSI. Retrieved from https://www.iisd.org/sites/default/files/publications/fiscal-instruments-indcs.pdf

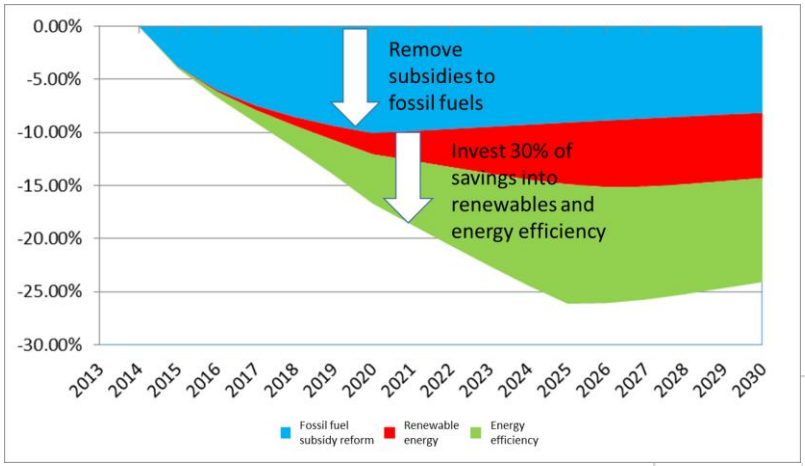
GSI-IF country modelling



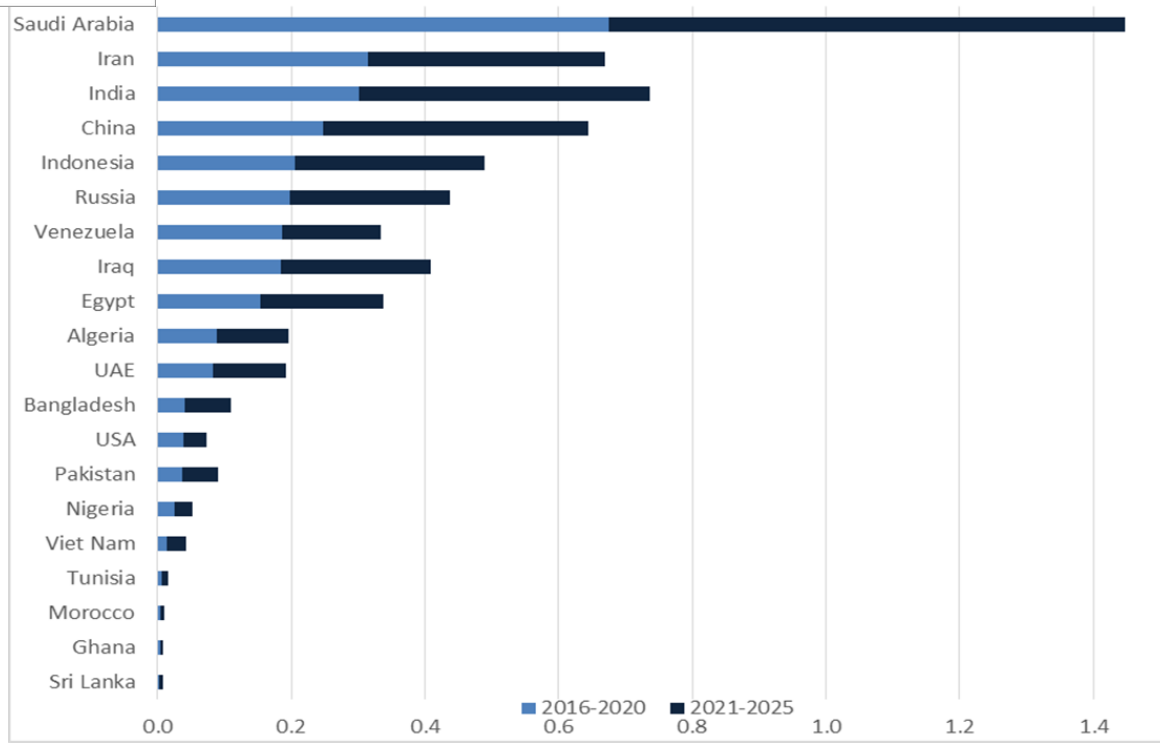
- GSI-IF (GSI-Integrated Fiscal model)
- Modelling the impact of FFSR, investment of savings in energy efficiency and renewables (SWAP) at the country level
- Developed and shared with 20 countries in 2015 (country reductions as a % of national emissions by 2020 against BAU): Algeria (22%), Bangladesh (9%), China (1%), Egypt (15%), Ghana (3%), India (3%), Indonesia (7%), Iran (18%), Iraq (41%), Morocco (2%), Nigeria (2%), Pakistan (3%), Russia (6%), Saudi Arabia (30%), Sri Lanka (2%), Tunisia (6%), UAE (14%), US (0.2%), Venezuela (34%), and Vietnam (2%).

Source: Merrill, L., Bassi, A.M., Bridle, R. & Christensen, T.L. (2015). Tackling fossil fuel subsidies and climate change: Levelling the energy playing field. TEMANORD, Norden. Retrieved from http://norden.divaportal.org/smash/record.jsf?pid=diva2%3A860647&dswid=8225

GSI-IF country modelling



Average of 11% in 2020 from 20 countries, increase to 18% by 2020 with modest recycling of saved revenues toward renewables (10%) and energy efficiency (20%).
USD 93 saved per tonne of CO2e abated from FFSR

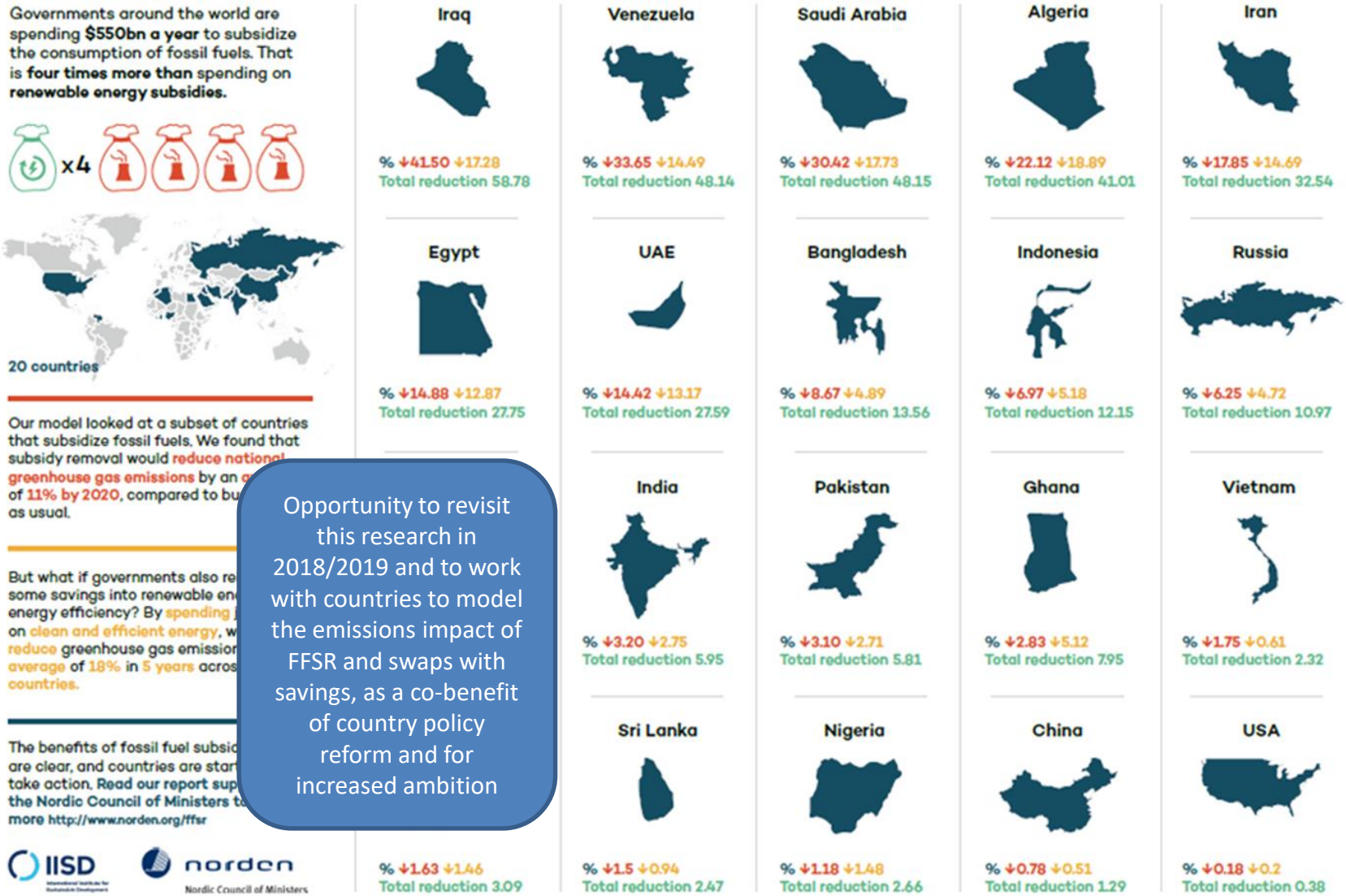


Cumulative total reductions across 20 countries

- 2.82 Gt by 2020
- 6.31 Gt by 2025

Source: Merrill, L., Bassi, A.M., Bridle, R. & Christensen, T.L. (2015). Tackling fossil fuel subsidies and climate change: Levelling the energy playing field. TEMANORD, Norden. Retrieved from http://norden.divaportal.org/smash/record.jsf?pid=diva2%3A860647&dswid=8225

Dissemination - countries



Opportunity to revisit this research in 2018/2019 and to work with countries to model the emissions impact of FFSR and swaps with savings, as a co-benefit of country policy reform and for increased ambition

Policy and link to NDCs

Inclusion of FFSR in INDC	
Egypt	Burkina Faso
UAE	Ethiopia
India	Singapore
Ghana	Sierra Leone
Viet Nam	New Zealand
Morocco	Senegal
China (energy pricing)	Mexico (energy pricing)
	Nigeria

- 40 INDCs use fiscal instruments (including the EU representing 28 countries)
- 25 clean energy subsidies
- 15 fossil fuel subsidy or energy sector reform

IISD currently reviewing the inclusion of fiscal instruments in NDCs

Source: Terton, A., Gass, P., Merrill, L., Wagner, A., & Meyer, E. (2015). Fiscal Instruments in INDCs: How countries are looking to fiscal policies to support INDC implementation. Winnipeg/Geneva: IISD/GSI. Retrieved from https://www.iisd.org/sites/default/files/publications/fiscal-instruments-indcs.pdf