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UNEP SUBMISSION TO THE AD HOC WORKING GROUP ON THE DURBAN PLATFORM FOR ENHANCED ACTION (ADP)

Opportunities for actions with high mitigation potential

Response from United Nations Environment Programme (UNEP) to the invitation from the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) to provide information on the following:

"Information from Parties and admitted observer organizations on the opportunities for actions with high mitigation potential, including those with adaptation and sustainable development co-benefits, as referred to in decision 1/CP.19 "Further advancing the Durban Platform", paragraph 5(a), including their mitigation benefits, costs, co-benefits and barriers to their implementation and strategies to overcome those barriers, including finance, technology and capacity-building support for mitigation action in developing country Parties." (FCCC/ADP/2013/L.4, paragraph 3, as orally amended2)

1. UNEP would like to thank the **Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP)** for the opportunity to highlight opportunities for actions with high mitigation potential.
2. The UNEP Emission Gap Report 2013 highlighted 4 sectors showing strong potential for international cooperative initiatives (energy efficiency, short-lived climate pollutants, forestry, fossil fuel subsidy reform). Building on UNEP's practical experience and on available research on the subject, this submission presents for each sector specific actions showing potential for international cooperation that could be launched, replicated or up-scaled to reach mitigation objectives. Mitigation benefits, costs, co-benefits and barriers to their implementation and strategies to overcome those barriers are also detailed for each action.

GENERAL BACKGROUND[1]

Since 2010, the United Nations Environment Programme has facilitated an annual independent analysis of the pledges and commitments of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), to assess whether they are consistent with a least-cost approach to keep global average warming below 2° C 1. The 2013 Emission Gap Report – from which the following data are extracted – confirms and strengthens the conclusions of the three previous analyses that current pledges and commitments fall short of that goal. It further says that, as emissions of greenhouse gases continue to rise rather than decline, it becomes less and less likely that emissions will be low enough by 2020 to be on a least-cost pathway towards meeting the 2° C target.

The most recent estimates of global greenhouse gas emissions are for 2010 and amount to 50.1 gigatonnes of carbon dioxide equivalent ($GtCO_2e$) per year (range: 45.6– 54.6 $GtCO_2e$ per year). This is already 14% higher than the median estimate of the emission level in 2020 with a likely chance of achieving the least cost pathway towards meeting the 2° C target (44 $GtCO_2e$ per year). Global greenhouse gas emissions in 2020 are estimated at 59 $GtCO_2e$ per year under a business-as-usual scenario. If implemented fully, pledges and commitments would reduce this by 3–7 $GtCO_2e$ per year. It means that even if pledges are fully implemented, the emissions gap in 2020 will be 8–12 $GtCO_2e$ per year, assuming least-cost emission pathways.

The technical potential for reducing emissions to levels in 2020 is still estimated at about 17 ± 3 GtCO2e. This is enough to close the gap between business-as-usual emission levels and levels that meet the 2° C target, but time is running out. The application of strict accounting rules for national mitigation action could narrow the gap by 1–2 GtCO2e. In addition, moving from unconditional to conditional pledges could narrow the gap by 2–3 GtCO2e, and increasing the scope of current pledges could further narrow the gap by 1.8 GtCO2e. These three steps can bring us halfway to bridging the gap.

The remaining gap can be bridged through further national and international action, including international cooperative initiatives.

Estimates of sectoral greenhouse gas emission reduction potentials, 2020 and 2030

Sector	Emission reduction potential in 2020 ($GtCO_2e$ per year)	Emission reduction potential in 2030 ($GtCO_2e$ per year)
Power sector	2.2–3.9	2.4–4.7
Manufacturing industry	1.5–4.6	2.5–5.5
Transportation	1.7–2.5	1.6–2.5
Buildings	1.4–2.9	5.4–6.7
Forestry	1.3–4.2	1.3–4.2
Agriculture	1.1–4.3	2.3–6.4
Waste	Around 0.8	0.4–1.0
Total (central estimate)	17 ± 3	23 ± 3
Total (full range)	**10–23**	**16–31**

[1] UNEP, The Emission Gap Report 2013, A UNEP Synthesis Report, 2013

The most significant areas for high-impact emissions reductions appear to be:

- Energy efficiency (up to 2 $GtCO_2e$ by 2020)
- Methane and other short-lived climate pollutants (0.6–1.1 $GtCO_2e$ by 2020)
- Forestry (1,3-4,2 $GtCO_2e$ by 2020)
- Fossil fuel subsidy reform (0.4–2 $GtCO_2e$ by 2020)

The section below takes a closer look at 8 specific actions – for which international cooperation is crucial – that could help to bridge the gap in these aforementioned areas.

ACTIONS WITH HIGH MITIGATION POTENTIAL

1. ENERGY EFFICIENCY

1.1. FOSTER MARKET TRANSFORMATION FOR EFFICIENT LIGHTING

General description

Lighting is responsible for 15% of global electricity consumption. Most countries still use obsolete and inefficient lighting technologies. Countries should accelerate the market transformation to environmentally sustainable lighting technologies through the development of standards at national and regional levels. .

The UNEP-GEF en.lighten initiative is being implemented since 2010 with the support of private sector companies. Through en.lighten a global consensus to phase-out inefficient incandescent lamps is being achieved, which constitutes a role model that could be up-scaled (http://www.enlighten-initiative.org/) globally.

Methodology: Support to regions and countries, and in consultation with international lighting experts in governments, private sector and civil society and the initiative promotes the adoption of an integrated policy approach to the transition to efficient lighting. The integrated policy approach includes:

- minimum energy performance standards;
- supporting policies;
- monitoring, verification and enforcement,
- environmentally sound management of used lighting products

Climate benefits

If all inefficient lamps worldwide are replaced with energy efficient lightning devices global electricity demand would be cut by 5% and GHG emissions drop an estimated 490 million tons of CO_2. This is equivalent to shutting down 250 large coal fired power plants.

Co-benefits

Efficient lighting significantly cuts electricity bills, improves grid and system reliability, reduces fuel imports and improves end-user welfare. In terms of financial benefits, UNEP estimates that replacing all the inefficient on-grid lighting globally today would result in 957 terawatt hours (TWh) of electricity savings annually, which is equivalent to over $108 billion in avoided electricity bills for consumers, and over $128.7 billion in avoided investment in coal-fired power plants. These savings would free up resources for other critical requirements such as healthcare, education and infrastructure improvements.

Financial Costs

The transition to efficient lighting is a very cost effective mitigation solution, with a short-term return on investment. The initial costs of the transition to efficient lighting vary from one country to the other, and according to the scope of the transition strategy (sectors and technologies covered). To provide an example, if

a country like India moved to efficient lighting solutions in all lighting sectors (residential, commercial and outdoor) it would save $2,6 billion in avoided electricity bills, with a payback period of only 9 months.

Remaining barriers

Several barriers remain, and are slowing down countries' actions toward energy efficient lighting. These barriers can be classified into one of four categories:

- **Governance and leadership**, including the lack of political will and limited action of governments to develop policies, standards, technical specifications, as well as overall lighting policies which accelerate the transition to efficient lighting;
- **Technical capacities**, which range from limited access to information, the know-how to put in place technical standards, use of supporting policies or other technical aspects related to ensuring control of quality and performance;
- **Financial instruments** including limited use of approaches that may reduce the upfront cost of efficient lighting, and limited budgets for supplementary measures such as monitoring, verification and enforcement, or for collection and recycling;
- **Technology transfer** issues which include research and development processes, diffusion of technologies, structural issues with imports and export tariffs, intellectual property rights, trade agreements, and technology licensing, among others.

Strategies to overcome barriers and support implementation

National and regional stakeholders are encouraged to utilize the various tools, mechanisms and institutional structures to undertake the transition to efficient lighting across sectors. The ultimate selection of these will depend on each country's specific circumstances and ultimate objectives.

Governance and Leadership	Technical capacities	Financial Instruments	Technology Transfer
- Develop National and Regional Efficient Lighting Strategies, including standards, labels and surveillance systems - Harmonise minimum energy performance standards (MEPS) and labelling at the regional level - Implement public awareness and educational campaigns - Develop shared regional quality control schemes	- Build and/or strengthen institutional capacities in governments - Strengthen monitoring, verification and enforcement capacities - Establish collection and recycling schemes	- Create financial incentives and fiscal instruments for financing the transition to efficient lighting	- Integrate lighting technology roadmaps with national or regional efficient lighting strategies

International financial institutions and bilateral and multi-lateral donor agencies play an important role in financing efficient lighting programmes, especially in those countries where the cost for a transition to efficient lighting becomes a financial burden. National Appropriate Mitigation Actions (NAMAs) for efficient lighting

constitute an instrument to create a National Efficient Lighting Strategy with a financial case aimed at obtaining support from donor agencies and international financial institutions. UNEP developed a guidebook to assist countries in the creation of NAMAs for efficient lighting based on a country-led national efficient lighting strategy. It aims to be a practical resource for governments (ministries of energy, environment, housing, climate change, finance, planning and others), private sector investors and civil society organizations.

1.2. PROMOTE ENERGY EFFICIENT APPLIANCES AND EQUIPMENT

General description

Increased ownership of appliances is driving electricity demand in many developing and emerging countries, and while appliance and equipment efficiency is improving in most developed countries this is not the case in developing ones. Electrical appliances in the built environment are the fastest growing energy users and unless Minimum Energy Performance Standards (MEPS) and a range of supporting policy measures are adopted and enforced across the developing and emerging nations, their economic development will cause an unsustainable growth in electricity demand and concomitant CO_2 emissions.

Climate benefits

This sector offers a high mitigation potential as it is estimated that:

a) **Air-conditioners:** Air conditioning (AC) systems represent a major energy end-use in many countries and contribute to peak load growth and energy consumption in the commercial and residential sectors. Should policies worldwide mandate the adoption of MEPS at currently available cost effective technology levels, annual energy demand could be reduced by over 10% by 2030. The cost effective annual saving potential in 2030 would be of 527 TWh and 343 million tonnes of CO_2 emissions.

b) **Refrigerators:** The global market of refrigerators doubled in the last 10 years. And in 2030 experts estimate that the non-OECD stock of fridges will more than double to approximately 1,600 million. Potential savings in non-OECD regions under a cost-effective policy scenario in 2030 are 219 TWh per year. This transition to efficient fridges would mitigate over 14 billion tonnes of CO_2 equivalent in avoided energy related emissions in 2030 compared with business as usual (BAU).

c) **Electric motors:** motors and motor-driven systems represent one of the most significant uses of electricity. The IEA projects that if all countries were to adopt current best practice mandatory Minimum Energy Performance Standards (MEPS) for new industrial electric motors alone, 322 TWh yearly, of electrical energy would be saved with a reduction of 206 Mt pa of CO_2 emissions and USD 22 billion yearly in costs to end users.

d) **Distribution Transformers:** an integral part of every electrical network, distribution transformers operate 24 hours per day, 365 days per year. Although distribution transformers often have efficiency levels greater than 98%, globally this equipment accounted for approximately 580 TWh of electricity losses in 2010, or about 290 million tonnes of CO_2 emissions. In 2010, the total CO2 emitted by distribution transformers losses in the non-OECD countries was approximately 137 million tonnes. Without intervention, these emissions will grow as those electricity markets expand and the CO2

intensity of the electricity increases to approximately 405 million tonnes in 2030, a three-fold increase in emissions.

Co-benefits

The co-benefits of promoting energy efficient appliances and equipment would be mainly:

a) Financial benefits: cumulative cost-saving for consumers (saved energy less the incremental equipment costs) are expected to be high. It is estimated that for air conditioners there would be net savings of 143 billion USD to consumers; for refrigerators it would result in a cumulative net cost saving for consumers of US$27 billion;
b) Environmental, health and well-being benefits: higher standards for appliances and equipment are expected to lead to less air and environment pollution, therefore resulting in general public health and environment improvement.

Financial Costs

The cost of an action of this type is difficult to assess, as it impacts many stakeholders. However, increasing energy efficiency is often cost-effective and upfront investment is generally more than compensated for by gains due to saved energy costs. The initial costs of the transition to efficient lighting would vary from one country to the other, and according to the scope of the transition strategy (sectors and technologies covered).

Remaining barriers

Several barriers remain and are slowing down progress toward energy efficiency in appliances and equipment. These barriers can be summarized as follow[2]:

- Policy barriers, such as market organization and price distortions;
- High project development costs relative to energy savings, high upfront capital costs and perceived capital risk and high transaction costs;
- Information barriers and lack of awareness of the financial benefits of financial institutions and of a large number of consumers to make informed consumer decisions;
- Lack of affordable energy-efficiency technologies that are suitable to local conditions and capacity to maintain energy-efficiency investments;
- Other legal, regulatory, institutional, financial and technological barriers.

Strategies to overcome barriers and support implementation

Successful transformation of markets to those with energy efficient appliances has already been achieved in some of the OECD countries, with some encouraging exceptions in some developing countries such as Ghana and Cuba. The approach to overcome the barriers hindering the spread of energy-efficient appliances is well

[2] UNFCCC Updated compilation of information on mitigation benefits of actions, initiatives and options to enhance mitigation ambition, 30 October 2013

known and depends on a series of specific policies designed and implemented by governments or regional integration bodies such as:

- Communication and awareness raising to influence consumer decision;
- Capacity building and knowledge sharing to allow countries to properly develop their own Minimum Energy Performance Standards (MEPS), testing standards, supporting appliance efficiency policies, environmentally sound management and systems to ensure compliance with the policies;
- Technology transfer, as improved products are already available and marketed elsewhere in the world, and these could easily be transferred.

An international cooperative initiative in this area could contribute to low carbon development through promoting energy efficiency in developing countries by supporting the establishment and implementation of integrated policy approaches including promoting standardization, supporting policies and mechanisms (favourable fiscal policy and incentives and market measures), ensuring compliance and the environmentally sound management of used appliances and equipment.

Building on the en.lighten initiative, UNEP in cooperation with UNDP, the Collaborative Labelling Appliance and Standards Programme (CLASP) and the International Copper Association (CLASP) has launched the Global Efficient Appliances and Equipment Partnership which provides global coordination, technical guidance and specific support to countries and regions to move to efficient appliances and equipment.

1.3. DRIVING TRANSFORMATION TO ENERGY EFFICIENT BUILDINGS

General description

Building accounts for about 40% of final energy use and up to 30% of all energy-related greenhouse gas emissions. Of the later, 45% was in OECD countries, 10% in countries in transition and 46% in developing countries. By 2050 at present trends, energy use would nearly double.

The building sector has the largest potential for delivering long-term significant and cost-effective greenhouse gas emissions reductions. With proven and commercially available technologies, the energy consumption in both new and existing buildings can be cut by an estimated 30 to 80% with potential net proofing during the building life-span.

Most developed countries and many developing countries have already taken steps towards reducing greenhouse gas emissions from the building sector, but these steps have had a limited impact on actual emissions levels, due to a number of barriers specific to the sector.

National action and international cooperation will be needed to significantly reduce the emissions from the building sector[3].

[3] UNEP, Buildings and Climate Change, Summary for decision makers, 2009

Climate benefits

According to the UNEP Emissions Gap Report 2012, the total mitigation potential in 2020 for buildings alone, compared with the "business as usual" scenario, is within a range of 1.4–2.9 Gt CO2 eq[4]. In the longer term, the estimate of the potential is higher.

Co-benefits

Significant co-benefits including employment can be created by policies that encourage energy efficient and low-emission building activity. If carefully planned, greenhouse gas mitigation strategies for buildings can stimulate the growth of new businesses and jobs, as well as contribute to other, equally pressing, social development goals, such as better housing and access to clean energy and water[5].

Financial Costs

Cost effective emission reductions and energy savings of more than 30% are possible in many countries. The IEA and OECD (2010) estimate that a 12.6 Gt reduction by 2050 could be achieved with an average investment of US$308 billion per year between 2010 and 2050[6].

Remaining barriers

Many countries have introduced policies to reduce greenhouse gas emissions from buildings through measures to improve energy efficiency. However, these policies have not realised full potential for reduction. Many studies have been conducted to try to understand why the energy savings potential in buildings is so difficult to achieve. Some of the underlying causes for the slow uptake of energy efficiency measures in the sector are listed below[7]:

a. Economic/ financial barriers
   - Higher up-front costs for more efficient equipment
   - Lack of access to financing Energy subsidies
   - Lack of internalization of environmental, health, and other external costs
b. Hidden costs/ benefits
   - Costs and risks due to potential incompatibilities, performance risks, transaction costs etc.
   - Poor power quality, particularly in some developing countries
c. Market failures
   - Limitations of the typical building design process
   - Fragmented market structure
   - Landlord/tenant split and misplaced incentives

[4] UNEP, The Emission Gap Report 2012, A UNEP Synthesis Report, 2012
[5] UNEP, Buildings and Climate Change, Summary for decision makers, 2009
[6] The IEA and OECD (2010) modelled a scenario that estimates a total investment of US$12.3 trillion required over this 40-year period, consisting of US$7.9 trillion in the residential sector, and US$4.4 trillion in the services sector. IEA's estimates are all in US$ 2007. In UNEP, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication, Chapter on Buildings, Investing in energy and resource efficiency, 2011
[7] UNEP, Buildings and Climate Change, Summary for decision makers, 2009

d. Administrative and regulatory barriers (e.g. in the incorporation of distributed generation technologies)
   - Unavailability of energy efficient equipment in some local market

e. Behavioural and organisational barriers
   - Tendency to ignore small energy saving opportunities
   - Organisational failures (e.g. internal split incentives)
   - Non-payment and electricity theft
   - Tradition, behaviour and lifestyle
   - Corruption
   - Transition in energy expertise
   - Loss of traditional knowledge and misapplication of design and technologies

f. Information barriers
   - Lacking awareness of consumers, building man- agers, construction companies, politicians

g. Political and structural barriers
   - Process of drafting local legislation is slow
   - Gaps between regions at different economic level
   - Insufficient enforcement of standards
   - Lack of detailed guidelines, tools and experts
   - Lack of incentives for EE investments
   - Lack of governance leader- ship/ interest
   - Lack of equipment testing/ certification
   - Inadequate energy service levels

Strategies to overcome barriers and support implementation

To overcome these barriers, governments must take the lead by prioritizing the building sector in their national climate change strategies and putting in place a number of measures, that include: credible and comparable energy performance standards; accurate and comprehensive data and information about the Building Sector; the appropriate skills-base and capacity to assess energy performance and implement energy efficiency policies; and systems and frameworks for consultations with all major stakeholders. Governments must work together with the building and construction industry, NGO and civil society organisations, research and educational institutes, and most importantly the public, to achieve the goal of reducing greenhouse gas emissions from buildings[8]. The UNEP report also highlights the need for stronger international cooperation in terms of capacity building, financing mechanism and technology transfer.

[8] UNEP, Buildings and Climate Change, Summary for decision makers, 2009

2. TRANSPORT

2.1. PROMOTE ENERGY EFFICIENCY AND REDUCED GREENHOUSE GAS EMISSIONS IN THE AUTOMOBILE SECTOR

General description

The transport sector (including shipping and aviation) currently accounts for 13% of global greenhouse gas emissions and has the highest projected growth rate of greenhouse gas emissions over the next decades. The adoption of measures to improve energy efficiency and reduce GHG emissions in the automobile sector offers high mitigation potential.

Some existing international cooperative initiatives offer good opportunity to reduce GHG emissions and short-lived climate pollutants (SLCPs) in the transport sector, if the measure they are encouraging are widely adopted, such as:

- Global Fuel Efficiency Initiative (GFEI)[9]

The Global Fuel Economy Initiative, a partnership between 6 organizations launched in early 2009, aims to improve the understanding of the fuel economy potential and cost of cars built and sold around the world, and to provide guidance and support on the development of policies to promote fuel efficient vehicles. Its activities include the following:

a. Development of improved data and analysis on fuel economy around the world, monitoring trends and progress over time and assessing the potential for improvement.
b. Work with governments to develop policies to encourage fuel economy improvement for vehicles produced or sold in their countries and to improve the consistency and alignment in policies across regions in order to lower the cost and maximise the benefits of improving vehicle fuel economy.
c. Work with stakeholders including auto makers to better understand the potential for fuel economy improvement and solicit their input and support in working toward improved fuel economy.
d. Support regional awareness initiatives to provide consumers and decision makers with the information they need to make informed choices.

- The Partnership for Clean Fuels and Vehicles (PCFV)[10]

The PCFV is a global partnership that assists developing countries to reduce vehicular air pollution through the promotion of lead-free, low sulphur fuels and cleaner vehicle standards and technologies. The Partnership aims to encourage countries to adopt overall clean fuel and vehicles strategies, including vehicle emission and fuel quality standards and inspection and maintenance. Adoption of stricter vehicle emission standards and better quality fuels are also critical for introducing more advanced and fuel efficient vehicles. It can also substantially reduce air pollutant emissions and SLPCs. The development and adoption of cleaner fuel standards and cleaner

[9] http://www.globalfueleconomy.org/
[10] http://www.unep.org/transport/pcfv/

vehicle requirements is supported through a platform for exchange of experiences and successful practices in developed and developing countries as well as technical assistance. Activities include:

a. Assist developing countries in developing action plans to complete the global elimination of leaded gasoline and start to phase down sulphur in diesel and gasoline fuels, concurrent with adopting cleaner vehicle requirements;
b. Reducing motor vehicle transportation fuel (in particular diesel) sulphur levels to 50ppm or below. The timeline and roadmap for this objective is country dependent;
c. Support the development and adoption of cleaner fuel standards and cleaner vehicle requirements by providing a platform for exchange of experiences and successful practices in developed and developing countries as well as technical assistance;
d. Develop public outreach materials, educational programmes, and awareness campaigns; adapt economic and planning tools for clean fuels and vehicles analyses in local settings; and support the development of enforcement and compliance programmes, with an initial focus on fuel adulteration; and
e. Foster key partnerships between government, industry, NGOs, and other interested parties within a country and between countries to facilitate the implementation of cleaner fuel and vehicle commitments.

Climate benefits

According to the UNEP Emissions Gap Report 2013, the mitigation potential for the transportation sector (excluding shipping and aviation) could reach 1.4 to 2.0 GtCO2e per year by 2020 through improvements in fuel efficiency, adoption of electric drive vehicles, shifting to public transit, and use of low carbon fuels. Improving fuel economy is one of the most cost-effective ways to reduce CO2 emissions. Concerning automobile, cutting global average automotive fuel consumption (L/100 km) by 50% (i.e. doubling MPG) would reduce emissions of CO2 by over 1 gigatonne (Gt) a year by 2025 and over 2 gigatonnes (Gt) by 2050.

Co-benefits

Energy efficiency in transport is linked to reduced emissions, including CO2 and black carbon emissions and significant improvement in urban air quality; and reduced fuel consumption and better fuel security.

Financial Costs

The potential benefits are large and greatly exceed the expected costs of improved fuel economy. Cutting global average automotive fuel consumption (L/100 km) by 50% (i.e. doubling MPG) would result in savings in annual oil import bills alone worth over $300 billion in 2025 and 600 billion in 2050 (based on an oil price of $100/bbl). For example, China introduced a fuel economy policy that has saved it close to $5 billion in fuel costs between 2006 and 2011[11].

[11] FIA Foundation, IEA, International Transport Forum, UNEP, 50by50 : Global Fuel Economy Initiative

Remaining barriers

Over the past decade many countries have introduced successful measures to promote efficient vehicles and the relevant measures are technically achievable. However, several barriers remain, and are slowing down progress toward this objective. In setting fuel economy policies in developing countries, the main barriers are the lack of understanding of many government agencies and as well as institutional coordination and collaboration among relevant government agencies.

For many individuals, much or all of the cost of improved technology for more fuel-efficient cars could be offset by the fuel saved in the first few years of use of a new car, especially at high oil prices. But unstable oil prices, which can fall as well as rise, create risks that dissuade many car buyers from paying an upfront premium for efficiency and dissuade automobile manufacturers from investing in highly fuel efficient vehicles because they cannot be sure of selling them[12].

Strategies to overcome barriers and support implementation

There are various and complementary options to overcome these barriers[13]:

- Provide timely information and share experiences on developing fuel economy policies to relevant government agencies
- Improve the information on fuel consumption and CO_2 emissions available to consumers. For example, some fuel efficiency tests can be somewhat misleading as they do not accurately reflect average in-use fuel economy
- Set regulatory standards for fuel consumption or CO_2 emissions that remove the uncertainty over how much investment in fuel efficiency is viable. Adopt cleaner fuel standards and cleaner vehicle requirements.
- Differentiate vehicle taxes according to CO_2 emissions or fuel economy to encourage consumers to prefer improved efficiency
- Provide incentives and set regulations for vehicle components that fall outside current vehicle testing, incentive and regulatory systems
- Engage car manufacturers in committing themselves to the objectives of this initiative and working toward producing vehicles that use 50% less fuel than at present.

2.2. SUPPORT THE DEVELOPMENT OF BUS RAPID TRANSIT (BRT) SYSTEMS

General description

Bus Rapid Transit (BRT) is a mass transport system based on buses that generally has specialized design, services and infrastructure to improve system quality and remove the typical causes of delay. It has proven to promote greater equity, have much lower costs and have more operational efficiency than the majority of

[12] FIA Foundation, IEA, International Transport Forum, UNEP, 50by50 : Global Fuel Economy Initiative
[13] FIA Foundation, IEA, International Transport Forum, UNEP, 50by50 : Global Fuel Economy Initiative

public transport systems throughout the world. Key elements of Bus Rapid Transit include frequent, high-capacity service; higher operating speeds than conventional buses; separated lanes; distinct stations with level boarding; and fare prepayment and unique branding.

Since the 1970s, BRT has expanded to more than 100 cities around the world, with the largest increase taking place during the last 10 years. BRT or similar systems are now in place in many cities in Latin America, Asia, North America, and Europe and represent approximately one percent of the global modal split[14].

UNEP and the Global Environment Facility in their Summary aimed at decision makers on "Planning and Implementation of a Bus Transit System in Latin America" presents BRT as one of the more appropriate options for cities around the world, but decision makers still confront many challenges when developing a BRT that more international cooperation and knowledge sharing could help overcome[15].

Climate benefits

In Bogota, Colombia, BRT is estimated to have resulted in emission reductions of 1.7 million metric tons CO2e over seven years[16]. In Ahmedabad, the BRT system has already shown several mitigation impacts. For example, 20 to 22% of commuters have moved from using their motorcycles to the bus. With an average trip length on the bus of 7km, this translates into a saving of almost 200,000 vehicle kilometres per day[17].

Co-benefits

BRT systems help to reduce local air pollution, traffic fatality rates, and road congestion. They also improve the quality of life of the inhabitants by reducing travel times.

Financial Costs

BRT are the most cost-effective option in terms of mass transportation as the capital costs of BRT systems are between one-third and one- tenth of that of rail system costs.

Remaining barriers

Barriers to more rapid expansion of BRT include inadequate fare levels and the fact that there is sometimes a preference for rail systems without adequate analysis of alternatives. Furthermore, overcrowding and deterioration of roadways in some places make BRT less attractive to potential users[18].

Strategies to overcome barriers and support implementation

According to the 2012 UNEP Emission Gap Report, some of the key principles that could facilitate the scaling up of transit-oriented development and BRT programmes are:

[14] UNEP, The Emission Gap Report 2012, A UNEP Synthesis Report, 2012
[15] UNEP, GEF, UNEP Risoe Centre, "Summary aimed at decision makers - Planning and Implementation of a Bus Transit System in Latin America", 2010
[16] UNEP, The Emission Gap Report 2012, A UNEP Synthesis Report, 2012
[17] UNFCCC, Momentum for Change, http://unfccc.int/secretariat/momentum_for_change/items/7098.php
[18] UNEP, The Emission Gap Report 2012, A UNEP Synthesis Report, 2012

(i) Identifying and assessing the co-benefits, such as road safety, improved air quality, job creation, social equity and health benefits, among others, in order to leverage political support.

(ii) Implementing the highest standard from the onset in order to minimise public discontent and makes future expansion and further investment easier.

(iii) Improving accessibility through the integration of transit with active modes and surrounding land uses in order to attract citizens out of their private vehicles.

(iv) Developing strong institutional support at the national, regional and local level to facilitate and ensure: the efficiency of passing legislation and regulations, the creation of comprehensive land use development policies, and the improvement of infrastructure finance mechanisms.

(v) Engaging industry early-on to identify appropriate technologies, lower costs, streamline procurement procedures, and create a proper finance structure[19].

[19] UNEP, The Emission Gap Report 2012, A UNEP Synthesis Report, 2012

3. REDUCE SHORT-LIVED CLIMATE POLLUTANTS

General description

Short-lived climate pollutants (SLCPs) are agents that have relatively short lifetime in the atmosphere – a few days to a few decades – and are responsible for a substantial fraction of near-term climate change, with a particularly large impact in sensitive regions of the world.. These short-lived climate pollutants are also dangerous air pollutants, responsible for various detrimental impacts on human health, agriculture and ecosystems. Key SLCPs, including methane, black carbon, tropospheric ozone, and many hydrofluorocarbons. Science has built a powerful case for action to reduce SLCPs and many of the mitigation measures are already being implemented around the world.

To scale up and accelerate SLCP emission reductions, UNEP together with the governments of Bangladesh, Canada, Ghana, Mexico, Sweden and the United States, launched the **Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC)** in February 2012: the first global, voluntary effort to treat SLCPs as an urgent and collective challenge. This coalition, which now brings together over eighty partners, including governments, intergovernmental organizations, NGOs and civil society, is taking action by organizing technology conferences to highlight available alternative technologies, carrying out inventory work, including trend assessment and evaluation of barriers to change, and funding demonstration projects to show the feasibility of new technologies.

The CCAC Partners have identified seven sectoral initiatives for rapid implementation by the Coalition that will ensure fast delivery of scaled-up climate and clean air benefits: Reducing Black Carbon Emissions from Heavy Duty Diesel Vehicles and Engines; Mitigating Black Carbon and Other Pollutants from Brick Production; Mitigating Black Carbon and Other Pollutants from household cooking and domestic heating; Mitigating SLCPs from the Municipal Solid Waste Sector; Promoting HFC Alternative Technology and Standards; Accelerating Methane and Black Carbon Reductions from Oil and Natural Gas Production; Addressing SLCPs from Agriculture. In addition, three cross-cutting initiatives are carried out: Promoting SLCP National Action Planning (NAPs); Regional SLCP Assessments; and Financing Mitigation of SLCPs.

Climate benefits

UNEP estimates that fully implementing measures to reduce the main short-lived climate pollutants by 2030 could achieve reductions in the global temperature increase between 2010 and 2050 of 0.4–0.5 °C. In addition, replacing high GWP HFCs with climate friendly alternatives can avert 0.1 °C by 2050 relative to a reference case with uncontrolled growth in HFCs.[20] It has the potential to avoid 0.6°C global average warming by 2050 and more than 0.84°C in the Arctic by 2070. In terms of greenhouse gas emissions reductions, the UNEP Gap Report estimates that the mitigation potential of reducing methane and other short-lived climate pollutants could reach 0.6–1.1 GtCO2e by 2020[21].

[20] CCAC Scientific Advisory Panel 2013 Annual Science Update
[21] UNEP, Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers, 2011

While fast action to mitigate SLCPs helps slowing the rate of global warming and avoid exceeding the 2°C target in the near-term, addressing SLCPs does not take away the urgency of deep and sustained cuts in carbon dioxide emissions to achieve long-term climate protection. Therefore, reduction efforts must be viewed as a strategy that complements but does not replace CO2 emission reductions.

Co-benefits

Important sustainable development benefits from reducing short-lived pollutants include: (i) improving national and local health and air quality: indoor and outdoor air pollution are important determinants of health[22] and the recently published Global Burden of Disease Assessment indicated that about 3.5 million deaths are due to indoor smoke exposure from cookfires and stoves, and estimated 3.3 million deaths are from outdoor air pollution related diseases, due to exposure to fine particulate matter and ozone. Mitigating short-lived climate pollutants by 2030 could prevent millions of premature deaths annually from indoor and outdoor air pollution; (ii) improved agriculture and ecosystems: Slowing the rate of near-term climate change reduces biodiversity loss, and loss of related ecosystem services. It is also likely to reduce the disruption of rainfall patterns caused by particule pollution. Mitigating short-lived climate pollutants by 2030 could reduce annual crop losses of about 50million tons each year after 2030[23]; (iii) many of the actions under the CCAC initiatives generate substantial energy efficiency gains and related energy cost savings, and help transition people from traditional biomass use to modern sustainable energy services, and thereby improve energy access and spur local development.

The research initiative, led by V. Ramanathan, Chair of the Atmospheric Brown Cloud programme of the UN Environment Programme (UNEP), calculated that the annual rate of sea-level rise could be reduced up to 24% by 2100 by controlling SLCPs, and that cumulative sea-level rise could be reduced by 22%[24].

Financial Costs

About half of the emission reductions of both methane and black carbon could be achieved by measures that would deliver financial cost savings (as a global average) over the lifetime of the measures. This estimate of cost savings does not account for the economic gains associated with reduced health, climate, crop yield and ecosystem impacts. However, these measures may be considered less profitable by private-sector investors who expect a fast return on their investments. As a result, it is unlikely that these measures would be implemented by market forces alone under current conditions. Nevertheless, the cost saving is an important feature that could encourage the development of financing schemes for these measures.

According to a 2011 UNEP Report, the cost of the measures range from those with low or negative cost, such as separation and treatment of biodegradable municipal waste ($29/t CO2e) or the introduction of more efficient brick kilns ($-7/t CO2e), to those with high to very high cost such as intermittent aeration of continuously flooded rice paddies ($130/t CO2e) or the introduction of high emissions standards for off-road mobile machinery ($1,400/t CO2e).

[22] Air Quality Guidelines. Global Update 2005. World Health Organisation 2006
[23] UNEP, Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers, 2011
[24] Hu A. et al., Mitigation of short-lived climate pollutants slows sea-level rise, Nature Climate Change, 2013

Remaining barriers

There are many barriers to implementing measures for reducing short-lived climate pollutants, including: lack of access to regional / national assessments of SLCP potentials, lack of institutional and human capacity in national governments, lack of access to targeted finance mechanisms / finance institutions' lack of confidence in new technologies, and lack of data / monitoring and verification. In addition, sector specific barriers exist[25]:

- In the residential sector: high fuel and technology costs; limited clean fuel supplies; low awareness of the health impacts of established cooking practices; limited durability of improved stoves; the high cost of technology; and lack of harmonized standards;
- In agriculture and forestry: weak enforcement of regulations; low stakeholder awareness; adherence to traditional practices; lack of adequate extension services; lack of capital and access to finance in the case of smallholder farmers; and the high costs of modified feed;
- In industrial processes: limited access to finance and skilled personnel; lack of awareness and appropriate LCA-based cost calculations; limited community awareness; and lack of relevant regulations and enforcement;
- In the fossil-fuel industry: high upfront investment costs; technical constraints; lack of infrastructure, lack of nearby markets; risk management tools insufficiently reflecting externalities; and the cost of monitoring and maintenance;
- In transport: unavailability of ultra-low sulphur fuels; and lack of regular inspection and enforcement;
- In waste management: high capital costs; low prices for methane; complex permitting schemes and liability issues; and the high cost of upgrading primary water treatment facilities.

The lack of available data and limited capacity in many countries also constitute two majors barriers to reducing short-lived climate pollutants.

Strategies to overcome barriers and support implementation

The CCAC is offering a set of strategies to overcome these barriers through its different initiatives:

- The CCAC Initiative on' Regional Assessments of SLCPs' provides targeted scientific information needed to accelerate and scale up SLCP reductions and support national planning; and helps enhance national capacity.
- The CCAC Initiative on 'Support to National Planning for Action to SLCPs' helps governments assess SLCP mitigation potentials and opportunities at the national level, and build a coordination mechanisms with stakeholders; develops analytical and assessment tools, and disseminate best practices.
- The CCAC Initiative on 'Financing mitigation of SLCPs' supports the design of tailored finance strategies for each sectoral initiative by facilitating, mobilising and structuring of expertise.
- The CCAC Initiative 'SLCP Emissions from Household Cooking and Domestic Heating' supports advocacy standards and testing as well as project development and enterpreneur support.

[25] UNFCCC Updated compilation of information on mitigation benefits of actions, initiatives and options to enhance mitigation ambition, 30 October 2013

- The CCAC Initiative 'Addressing SLCPs from Agriculture' has three focal areas in which to reduce barriers: methane emissions from livestock, with a focus on manure management; Black Carbon from open agricultural burning; Methane emissions from paddy rice cultivation.
- The CCAC Initiative 'Brick Kilns' establishes networks of experts to support reduction assessments, policy development and implementation, and technology adoption to improve brick kilns; raising awareness; and facilitating knowledge sharing.
- The CCAC Initiative 'HFC Alternative Technologies and Standards' helps establish HFC inventories; raise awareness; and develop Case Studies demonstrating climate-friendly alternatives.
- The CCAC Initiative on 'Accelerating methane and Black Carbon reductions from oil and natural gas production' reaches out to company leadership and country ministers; and builds upon and scales up achievements of the Natural Gas STAR International Programme, the Global Methane Initiative, and the Global Gas Flaring Reduction Partnership.
- The CCAC Initiative on 'Black Carbon emissions from Heavy Duty Diesel Vehicles and Engines' supports development of policies that require low sulphur diesel fuel to enable introduction of filter-based emission controls; promotes incentives that encourage uptake of energy efficiency technologies that will lower fine particle emissions (Green Freight Programme); and sets up a program to address elevated emissions from existing vehicle stock through retrofits, scrapage, inspection and maintenance.
- The CCAC Initiative on 'Mitigating SLCPs from Municipal Solid Waste (MSW)' supports cities to develop a roadmap for MSW management to reduce SLCP emissions; develops emission reduction calculation and other capacity building tools; and establishes a knowledge platform and a city mentoring programme.

4. REDUCE EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION

General description

Forests provide major ecosystem services such as watershed protection and biodiversity conservation, as well as livelihoods for around 1.6 billion, mostly poor, people. Greenhouse gas emissions from the forestry sector are caused by deforestation and forest degradation. These emissions, which constitute the largest non-energy source of greenhouse gas emissions, are estimated to be 4.4 $GtCO_2e$ per year in 2008, and represent about 11% of global anthropogenic CO_2 emissions.

The 2013 UNEP Emission Gap Report describes policies that are effective at curbing deforestation. Four distinct policy categories are presented[26]:

a. ***Establishing protected areas:*** This involves designating some forest areas as protected areas. This is arguably the most common policy instrument for preserving tropical forests. It is generally effective in preventing deforestation, but is even more effective when the protected areas are close to expanding frontiers (e.g., expanding agricultural frontiers) rather than in remote low-threat areas.
b. ***Using command-and-control measures:*** This involves the enactment and enforcement of environmental regulations and putting in place adequate monitoring structures to ensure compliance.
c. ***Using economic instruments:*** This involves the use of economic tools such as taxes, subsidies and payments for ecosystem services for encouraging forest.
d. ***Creating policies affecting drivers and contexts:*** This involves creating or changing sectoral policies, institutional frameworks and governance structures so as to influence the dynamics of deforestation.

The international cooperative initiative "Reducing emissions from deforestation and forest degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks" (REDD+) is proving to be an interesting tool for achieving the goal of halting global forest cover loss, providing low-cost opportunities for mitigating emissions while producing important co-benefits. The REDD+ Programme supports the design and implementation of REDD+ National Programmes; produce complementary support to national REDD+ action through common analysis, methodologies, and tools; and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest-dependent communities, in national and international REDD+ implementation. The Programme also works to build international awareness and consensus about the importance of including REDD+ mechanisms in a future climate change agreement. There are considerable challenges associated with the scaling up of the programme.

Climate benefits

According to the UNEP Emissions Gap Report 2012, the forestry sector has the potential to reduce emissions by 1.3–4.2 $GtCO_2e$ by 2020, while mitigation potential from agriculture is reported to range from 1.1 to 4.3 $GtCO_2e$. However, the uncertainty of these estimates is much higher than those for energy, transport and short-lived pollutants.

[26] UNEP, The Emission Gap Report 2013, A UNEP Synthesis Report, 2013

Co-benefits

Beyond its mitigation benefits, curbing deforestation also have significant co-benefits in the following areas:

- Local adaptation benefits: for example, trees and densely vegetated areas bind soils, prevent leaching of vital nutrients and in some cases can contribute to watershed protection, reduce the risk of extreme flooding and reduce the amount by which a locality will overheat.
- Conservation of forest biodiversity
- Water regulation
- Soil conservation
- Social benefits, such as jobs, livelihoods, land tenure clarification, carbon payments, enhanced participation in decision-making and improved governance. For example, an annual investment of $30 billion into reduced deforestation and degradation of forests could sustain up to 8 million additional full-time workers in developing countries.

Remaining barriers

The barriers identified in the UNFCCC technical paper as key challenges for forestry mitigation accurately reflect current situation. The barriers can be listed as follow[27]:

- Limited access to financial resources and lack of long-term international funding;
- Poor enabling environments and institutional readiness for scaling up of successful pilot activities and best practices;
- Lack of incentive for forest managers;
- Lack of enforcement of existing regulations;
- Vulnerability and non-permanence of forest resources and the impact of natural disasters;
- Potential impacts on food security if global food production is constrained.

The paper also details further barriers specific to implementing REDD+ activities such as:

- Incomplete methodological guidance (e.g. reference levels, national forest monitoring systems, and measurement, reporting and verification regime);
- Poor data on forest inventories and estimated CO2 emissions and removals (e.g. the rate of deforestation and plant species disappearance);
- Lack of sufficient understanding of the drivers of deforestation (e.g. private- sector activities and international markets);
- Poor institutional framework (e.g. national forest governance, soil legislation, land-use policy and land tenure structure);
- Illegal logging (fuelled by both local and multinational companies).

[27] UNFCCC Updated compilation of information on mitigation benefits of actions, initiatives and options to enhance mitigation ambition, 30 October 2013

Strategies to overcome barriers and support implementation

To overcome the barriers hindering the realization of the mitigation potential from forestry, multiple and location-specific strategies are required to guide mitigation policies in the sector. Participation of all stakeholders and policy-makers is critical to ensure the design of an optimal mix of measures. Overcoming barriers also requires institutional capacity, investment capital, technology, R&D and transfer, as well as appropriate (international) policies and incentives. Capacity building, to be most effective, must be demand-driven and nationally and regionally relevant. Accordingly UNEP is leading the development of the REDD+ Academy, a two-week course that will combine a core curriculum delivered by UN-REDD agencies and partners with regional curriculum designed and delivered by regional partners. The REDD+ Academy will be convened in Africa, Asia, and Latin America and will also include a Massive Open Online Course (MOOC).

In addition to more dedicated enforcement of regulations, well-constructed carbon markets or other environmental service payment schemes may help overcome barriers to reducing deforestation by providing positive financial incentives for retaining forest cover[28].

Non-market based approaches also proved to be efficient. For example, policy measures such as subsidies and tax exemptions have been used successfully to encourage afforestation and reforestation both in developed and developing countries.

[28] IPCC, Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007

5. FOSSIL FUEL SUBSIDY REFORM

General description

An increased focus on the issue of energy subsidies by the international community is of utmost importance, as it is becoming increasingly apparent that fossil fuel subsidies are undermining international efforts to reduce greenhouse gas emissions:

- Subsidies often lead to increased levels of consumption and waste, exacerbating the harmful effects of energy production and use on the environment.
- They often place a heavy burden on government finances, weakening the potential for economies to grow and reducing the potential to invest in social equity.
- They can undermine private and public investment in renewable energy and energy efficiency by distorting price, and thus hinder and delay the needed energy transition to reduce greenhouse gas emissions.
- They create price signals which can impede the expansion of distribution networks and the development of more environmentally benign energy technologies such as decentralised renewable energy technologies.
- They often fail to help the people who need them most, the poorest.

Climate benefits

Phasing out fossil fuel subsidies would benefit the climate in three major ways. First, elimination of fossil fuel subsidies would lead to reduction in the production and consumption of fossil fuels, hence reducing greenhouse gas emissions. Second, eliminating fossil fuel subsidies can free up finance needed for urgent mitigation and adaptation to climate change[29]. Third, eliminating fossil fuel subsidies send a right signal to market, so the much needed private investment could be driven towards low carbon technologies.

UNEP estimates that fossil-fuel subsidy reform implemented globally could achieve reductions in greenhouse gas emissions of 0.4 to 2 GtCO2e by 2020[30].

Co-benefits

The IEA's latest estimates indicate that fossil-fuel consumption subsidies worldwide amounted to $544 billion in 2012[31]. According to the International Monetary Fund (IMF), pre-tax subsidies for petroleum products, electricity, natural gas, and coal reached $480 billion in 2011 and post-tax energy subsidies (the sum of pre-tax and tax subsidies) are even larger, amounting to $1.9 trillion in 2011[32].

Reforming these subsidies for a more sustainable development would also produce various co-benefits:

[29] Shelagh Whitley, Time to change the game, Fossil fuel subsidies and climate, November 2013
[30] UNEP, The Emission Gap Report 2013, A UNEP Synthesis Report, 2013
[31] IEA, Worl Energy Outlook, 2012
[32] IMF, Energy Subsidy Reform : lessons and implications, 2013

- Create a level playing field for investment in energy capacity, between fossil fuels and sustainable energy (renewable energy and energy efficiency).
- Provide incentives for investing in clean energy
- Promote economic growth and improve energy security, through reduced economic exposure to energy prices fluctuations and use of locally available energy resources.
- Alleviate poverty and improve social welfare by reallocating the subsidies more efficiently and in a more targeted way
- Reduce the use of fossil fuels, hence reducing associated health and environmental impacts on air, water and land.
- Unlock financing to adapt energy production to climate change.

Financial Costs

The potential benefits of a fossil fuel subsidy reform greatly exceed the expected costs and would even free up finance needed for urgent mitigation and adaptation to climate change. In most countries, it would represent potential annual saving for a majority of the population, who usually bear the net cost of the subsidy and lose in net terms. However, the impact would be negative on the small segment of the population or on the actors who enjoyed the benefits of this subsidy[33].

Remaining barriers

Even when there is general agreement that the cost of a particular subsidy outweighs its benefits, it can be very difficult to reform the subsidy in the face of hostility from those who benefit from it. By its very nature, the costs of an energy subsidy are spread throughout the economy, while most of its benefits are often enjoyed by only a small segment of the population. The resistance to cutting subsidies can be very strong, as the beneficiaries will always have an interest in defending that subsidy when their gains exceed their share of the economic or environmental costs[34].

Recent assessments by the International Monetary Fund (IMF) of country experiences in energy subsidy reform have identified six main barriers, listed in the UNFCCC technical paper[35]:

a. Lack of information regarding the magnitude and shortcomings of subsidies;
b. Inherent rigidity and inertia of many subsidy programmes;
c. Lack of government credibility and administrative capacity;
d. Concerns regarding adverse impacts on the poor, inflation, international competitiveness and volatility of domestic energy prices;
e. Opposition from specific interest groups benefiting from the status quo;
f. Weak macroeconomic conditions.

[33] UNEP Division of Technology, Industry and Economics, Reforming Energy Subsidies - Opportunities to Contribute to the Climate Change Agenda, 2008
[34] UNEP Division of Technology, Industry and Economics, Reforming Energy Subsidies - Opportunities to Contribute to the Climate Change Agenda, 2008
[35] UNFCCC Updated compilation of information on mitigation benefits of actions, initiatives and options to enhance mitigation ambition, 30 October 2013

Strategies to overcome barriers and support implementation

Despite these barriers, many countries have already implemented successful reforms, from which useful lessons can be drawn. The following approaches can help policymakers to overcome resistance when implementing reforms[36]:

a. Reforms can be introduced in a gradual, programmed fashion to alleviate the financial pain of those who stand to lose out. Financial support for coal mining in France, for example, was finally ended with the closure of the country's last mine in 2004 under a closure programme originally agreed upon in 1986. Nonetheless, the gradual removal of subsidies carries some drawbacks: the benefits are delayed and the reforms run the risk of being reversed later.
b. The reform has to be done with appropriate social safeguards: Well-targeted compensation measures are crucial for a successful reform.
c. Politicians need to communicate clearly to the public the overall benefits of subsidy reform to the economy and to society in order to counter political inertia and opposition.

In the "Energy Subsidy Reform: lessons and implications", the International Monetary Fund lists the following measures that countries can implement in order to overcome barriers[37]:

a. A comprehensive reform plan;
b. A far-reaching communications strategy, aided by improvements in transparency;
c. Appropriately phased energy price increases, which can be sequenced differently across energy products;
d. Targeted mitigating measures and social safeguards to protect the poor;
e. Depoliticizing energy pricing to avoid the recurrence of subsidies.

At the international level, awareness raising and knowledge sharing could provide incentive to governments to engage in a fossil fuel subsidy reform.

[36] UNEP Division of Technology, Industry and Economics, Reforming Energy Subsidies - Opportunities to Contribute to the Climate Change Agenda, 2008
[37] IMF, Energy Subsidy Reform: lessons and implications, 2013

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