Coordinating finance for sustainable refrigeration and air conditioning

BMU side event, MOP 30, 7 November 2018, Quito - Ecuador

Cool Contributions fighting Climate Change (C4) Project

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany
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<td>Overview, focus and status quo of current finance options in the RAC sector</td>
<td>Philipp Munzinger, Project Manager, GIZ Proklima Jürgen Usinger, Senior Consultant, HEAT GmbH</td>
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<td>Planning and monitoring of funds for EE and HFC reduction in the RAC sector</td>
<td>Emilia Battaglini Program Manager for the MP and GEF, World Bank</td>
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<td>Opportunities in coordinating finance in Colombia</td>
<td>Leydy Maria Suarez Orozco, Coordinator National Ozone Unit, Colombia</td>
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<td>Leslie Smith, Coordinator NOU, Grenada</td>
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Coordinating finance for sustainable refrigeration and air conditioning

BMU side event, MOP 30, 7 November 2018, Quito - Ecuador

Philipp Munzinger, Jürgen Usinger
Cool Contributions fighting Climate Change (C4) Project, GIZ Proklima
Background

• Highly efficient technologies are available from major producers, covering >90% of world market
• Rapid developments on EE of low GWP appliances

Supply

Demand

End-of-life

• Availability depends on demand
• Market investment follows progressive (incentive) policies
• Urgent need to avoid lock-in of interim technologies and define time frames for major step changes

• Lack of after use infrastructure strongly neglected, resulting in heavy emissions tail
• Servicing sector has key role in changing practices to reduce continuously growing F-Gas banks

Source: GIZ Proklima 2017
Challenges

Short-term:

• **Effective policies** are the main driver for investments in efficiency of the public and private sector.
• **Best practice servicing** is imperative in order to fully realize efficiency potentials of existing and future stocks.
• Grants structure remains ineffective where it **disrupts the already ongoing initiative** of the private sector (as in the case of 134a conversion).
• To investigate the limits or barriers of **existing A5 lending and capital market** structures.
• To develop strategies for appropriate managing **lending and risks of specific markets**.

Long-term:

• Necessary to identify suitable options for **timely step changes**, accelerate the development and introduction of **(near) zero emission technologies** and national plans on key interventions.
• Selection of incentives for technology development on a **national/regional effort**, including **wholistic concept** of building envelope and equipments.
Rationale

• Provision and effective deployment of finance to enable widespread uptake of climate friendly technologies one of the challenges to achieve Paris Agreement goals.

• RAC sector faces a particular challenge in the implementation of effective finance strategies:
  o Cross-sectoral nature – extending from manufacturing of gases and appliances to energy use in various fields of application
  o different institutional responsibilities as well as policy and compliance regimes

➢ Need for effective finance strategies, securing necessary funding from national and international sources, based on robust estimation of costs and investment needs in the RAC sector.
Purpose of paper

- Provide an overview of the current (climate) finance landscape in the RAC sector
- Discussion of the different available sources of finance for ambitious reductions of direct and indirect emissions, and roles of different actors in this regard.
- Starting point for the development of further guidance and recommendations on the elaboration of integrated finance strategies to enable countries, in particular developing countries, to achieve the low-carbon transition.

Paper developed in cooperation with HEAT GmbH and NewClimate Institute
Available [here](#)
Content

- Understanding the RAC sector in the climate context
  - Relevance of the RAC sector for Climate Change
  - Implications of the Paris Agreement for the RAC sector

- Financing low carbon development in the RAC sector
  - Financing direct emissions reduction in the RAC sector
  - Financing direct emissions reduction in the RAC sector

- Recognizing barriers and the role of different actors to provide finance & support
  - Understanding barriers
  - Role of public sector and national budgets
  - Role of international public finance and support
  - Role of private sector finance

- Preparing strategies to access finance
  - Defining targets and identifying available finance sources
  - Options to access finance sources
  - Criteria for funding proposals
  - Typical funding criteria of major national and international finance sources

Coordinating finance for sustainable refrigeration and air conditioning
Main Findings: Opportunities and Challenges

- The RAC sector is a rapidly growing sector that offers highly cost-effective mitigation potentials.
  - mitigation potentials remain largely untapped.
  - important to stress the relevance of the RAC sector for overall NDC achievement
  - promote ambitious, sectoral mitigation action in the national and international climate discourse.

- The RAC sector falls within the scope of two international regimes.
  - finance flows from different national and international actors and budgets must be aligned and integrated
  - coordination on a national level imperative for effective implementation.

- The Kigali Amendment is a first step towards the integration of the two regimes at the global level.
  - financial support of Kigali primarily addresses production and consumption of HFCs
  - integration and coordination of national and international finance flows offers synergetic benefits
  - the sector-wide approach of the MLF could be adopted by other funding mechanisms for mitigation of indirect emissions from energy use,
  - precedence for the implementation of the 1,5° target in other sectors as well.
Main Findings: Needs Assessment

- A comprehensive analysis of local barriers, needs and costs essential
  - enhanced action must, first of all, take place at the domestic level.
  - international support for leveraging the full potential of domestic action, but
  - Financial support international budgets only to overcoming specific barriers, and it is of
  - key importance to address the identified barriers with a broader set of policy interventions ahead or along financially supported action.

- A country strategy should outline a clear breakdown of action, impact and financial contributions
  - Strategic outlook to avoid lock in to interim technologies, evaluate limitations of EE, indicate necessary step changes to achieve absolute reductions in line with 2050 targets and beyond.
  - an enabling environment is needed to initiate mitigation action and related investments and finance from other sources, specifically the private sector.

- Private sector engagement is key for long-term, low-carbon development
  - private finance to significantly scale up and sustain investments, e.g. in the form of project development, commercial financing, public-private co-financing or engagement in project or sector related market mechanisms.
Main Findings: Enhancing Access to Finance

- Development synergies are an effective incentive for national stakeholder engagement
  - address local synergies with other issues such as food and job security, reduction of imports, energy services, productivity, quality of services and products, NDC management and initiation legal reforms.

- Enhanced coordination of finance flows under the climate regime, MLF, GEF, GCF, NAMA Facility and development banks
  - Coordinate national action through intergovernmental/stakeholder working groups and develop national capacity and focal point to manage financial flows
  - Generate political support of national and international stakeholders to strategically align efforts across bi- and multilateral financing institutions
  - coordinate action of donors and beneficiaries throughout the various technical and financial working groups of relevant financing mechanisms.
  - support shared dialogue platforms that help to facilitate a regular exchange of information on funding activities between different finance mechanisms and identify gaps and potential for further synergies.
Barriers toward unlocking more effective finance

- **Regulatory & policy barriers** – lack of a stringent policy framework (weak standards and missing incentives) which provides a stable investment environment and long-term certainty to potential investors in green cooling solutions and technologies.

- **Institutional & information barriers** – lack of coordination between key institutional and private sector actors, a lack of knowledge and data on mitigation options, potentials and technology choices, as well as lack of capacities in key institutions including for example, the banking sector.

- **Economic & financial** – access to capital markets and commercial finance, high transaction costs given typically small project values, distorting fiscal policies or more general risk perception of new and innovative technologies.

- **Technology & market** – lack of technology and inertia of incumbents in the market, structural barriers such as “split incentives” in the building sector, R&D
Role of public sector

• **Optimisation of the regulatory and policy framework**, for example through the adoption (and regular updating) of mandatory Minimum Energy Performance Standards (MEPS) and labels across a wide spectrum of appliances and equipment;

• **Strengthening of national institutions**, e.g. through targeted capacity building, to ensure effective enforcement of laws and regulations and monitoring of fiscal and financial policies;

• **Creation of a national framework for cooperation and dialogue** between public and private sector actors on investment opportunities and risk mitigation options;

• **Creation of financial incentives**, such as endorsement schemes, deposit systems or rebate programmes, to encourage private sector engagement and facilitate full market penetration of energy efficient cooling technologies and low-GWP refrigerants;

• **Coordinating finance** for sustainable refrigeration and air conditioning...
Role of international public finance and support

• “Bridging the gap” through the provision of upfront financing as well as technical support and capacity building, where domestic budgets are not capable of leveraging the required private sector capital

• **Targeted energy efficiency measures** in the RAC sector as part of larger energy efficiency / urban development programmes

• Huge potential to streamline criteria of funding activities of all international finance institutions (including the MLF and climate focused institutions) in order to support a more integrated approach

• Often developing countries **lack appropriate infrastructure to absorb and manage the funds**, including mature financial markets and a conducive policy environment
Role of the private sector

- **Scaling up and sustaining (public) climate and energy investments**, both in the supply (manufacturing) and the demand (investor, end user) sector, by filling the enormous funding gap that exists in almost all sectors that are transforming towards low carbon development;

- **Supporting (public) project development**, commercial financing, and the development and promotion of innovative finance mechanisms (e.g. climate bonds);

- Co-financing large-scale energy infrastructure projects with public interest in the form of public private partnerships (PPPs), involving dedicated credit lines, risk-sharing facilities or Energy Saving Performance Contracts that target specific energy efficiency market barriers;

- **Getting involved through project or sector related mechanisms** such as the PA Sustainable Mechanism, Clean Development Mechanism (CDM), Joint Implementation (JI) or Nationally Appropriate Mitigation Actions (NAMAs).
Preparing access strategies to finance and support

1. Define RAC sector targets for NDCs (HFC reduction and EE)
2. Identifying available finance resources
3. Understanding options to and criteria of major national and international finance sources
Three main findings of the latest IEA study on promoting EE for AC *

- Develop and implement a comprehensive national policy on cooling and enhance regulatory measures
- Improve information availability, quality and impact on consumers and professional decision makers
- Bolster incentives, including financial incentives, for energy efficiency purchase and collaboration on cooling-related research (nat./reg./int. level)

*Adapted from IEA; The Future of Cooling Opportunities for energy-efficient air conditioning, 2018
Summary recommendations of the latest IEA study on promoting EE for AC

*Adapted from IEA; The Future of Cooling Opportunities for energy-efficient air conditioning, 2018*

- Develop **long-term policy framework**, including information, incentives and **enforceable** regulations
- **Involve sector stakeholders** from government, industry and consumer groups and
- take into account the **multiple benefits of energy efficiency**, lifecycle energy use and carbon emissions.
- Enhance **effective MEPS for air-conditioning equipment**, energy codes and **standards** for **existing and new** buildings
- Review incentives for uptake of **energy-efficient and renewable energy** solutions for buildings.
- Introduce effective, **mandatory** AC equipment and buildings **labelling policies**
- Institutionalise **test procedures, labelling and reporting**.
- Compile information and improve **data collection and statistics** on energy efficiency indicators.
- Define requirements for maintenance and operation that **improve demand-side management**.
- Support **information distribution** on AC maintenance, behaviour, building management, and
- support **capacity-building efforts** for planers and installers of cooling-systems.
- **Incentives**, e.g. financial backing, **for intermediaries that supply or finance** the purchase of efficient cooling technologies.
- Support **national/international collaboration in cooling research** and transfer of knowledge to countries and regions.
- **Financially support cooling research**, focusing on emerging technologies (NZE) with **long term reduction potential**.
Energy Efficiency not necessarily more expensive

Highly efficient technologies in the market at reasonable pricing - retail prices are not sufficient to explain cost of maintaining and/or enhancing EE!

Retail price vs efficiency of 3.5kW mini-split ACs on the Chinese market [Shah, Park and Gerke, 2017]
Source: LBNL’s IDEA database and the Chinese National Institute of Standardization database
IEA: Global building sector is leading investments in EE

Energy efficiency investment by region and sector

HVAC and appliances make 16% of global energy efficient investments (Industrial cooling not included)

Incremental energy efficiency investment in buildings, 2015-16

HVAC and appliances make 28% of energy efficient investments in the building sector compared to 51% for envelope.

IEA: Energy efficiency is being delivered through policy

Buildings sector energy consumption, energy intensity and floor area (2010-16)

Only HVAC and appliances consuming about 20% of energy globally, 2030 70% in A5, EE to maintain energy consumption at present level (not in A5)

Japan and Korea very active on equipment policies, China lagging behind.

Share of space heating and cooling efficiency policy progress since 2000 from building envelopes vs. HVAC equipment

Source: Adapted from IEA (2017e), Efficiency Policy Progress Index (database).
Map of MEPS and labelling for air conditioners

*IEA; The Future of Cooling Opportunities for energy-efficient air conditioning, 2018
Coordinating synergies and challenges implementing HFC phase down and Energy efficiency

<table>
<thead>
<tr>
<th></th>
<th>Energy efficiency</th>
<th>HFC mitigation</th>
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</thead>
<tbody>
<tr>
<td><strong>Direct emission</strong></td>
<td>CO2 intensity of fossil fuel use in the electricity production (energy mix)</td>
<td>HFC Production, Manufacturing, Use, Servicing, Disposal</td>
</tr>
<tr>
<td><strong>Indirect leakage factors</strong></td>
<td>Distribution, Heatload (climate, building envelope, behavior), Energy Performance, Wear&amp;Tear, <strong>SMR</strong>*</td>
<td>Charge Size, Hermitization, (Wear&amp;Tear), <strong>SMR</strong>*, Disposal</td>
</tr>
<tr>
<td><strong>Mitigation principle</strong></td>
<td>Reduce CO2 Intensity of Energy Performance while consumption increases</td>
<td>Total reduction to sustainable Consumption Cap (0 to x% of BAU)</td>
</tr>
<tr>
<td><strong>Compliance obligation</strong></td>
<td>NDC, No binding target yet</td>
<td>MP, Yes</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Mature markets for high efficiency technologies</td>
<td>HFC alternatives developed and introduced into markets</td>
</tr>
<tr>
<td><strong>Intervention focus; Monitoring</strong></td>
<td>Demand Side</td>
<td>Supply Side</td>
</tr>
<tr>
<td><strong>Sustainability of Alternatives</strong></td>
<td>No, gradual adaptation requires several technology step changes</td>
<td>Yes (in view of climate change)</td>
</tr>
<tr>
<td><strong>Reduction effect 2050</strong></td>
<td>Consumption could be kept at actual consumption levels (maximum)</td>
<td>Reduction equal to more than 95% of projected BAU in 2050</td>
</tr>
<tr>
<td><strong>Sustainable after 2050</strong></td>
<td>No, depends on step change and other measures in the energy sector</td>
<td>(Yes)</td>
</tr>
<tr>
<td><strong>Main instruments</strong></td>
<td>Demand side policy focus, <strong>Capacity building/ TA</strong>, Financial risk mitigation, lending, R&amp;D collaborations</td>
<td>Supply side policy focus, Prod./Manufacturing Quotas/ bans, Man. Conversions, Grants, <strong>Capacity building/TA</strong></td>
</tr>
<tr>
<td><strong>Impact dependency on co-measures</strong></td>
<td>Very High, integration w/ energy supply and buildings essential</td>
<td>Limited to low</td>
</tr>
</tbody>
</table>

* **SMR**: Servicing, Maintenance, Repair
## Costs and support needs for energy efficiency improvements

### Mitigation options, HFC and energy efficiency

<table>
<thead>
<tr>
<th>Group1*</th>
<th>Group2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️ Conversion of emission intensive production/manufacturing, low-emission design of products, services and processes</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ Capacity building in the manufacturing sector</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ ✔️ Introduction of eco-design principles and regulations in the national framework for products, services and processes</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ ✔️ Assisting regulation and fiscal measures for imports of products, services with low-emission design</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ ✔️ Additional market incentives for replacement of high emission products, services and processes</td>
<td>✔️</td>
</tr>
<tr>
<td>✔️ ✔️ Capacity building in the end user, servicing and disposal sector</td>
<td>✔️</td>
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</tbody>
</table>

* Group 1 Countries w/manufacturing, Group 2 No manufacturing
2. Identifying available finance resources

Coordinating finance for sustainable refrigeration and air conditioning

Source: HEAT GmbH, 2018
Recognizing the role of different actors to provide finance and support

**FUNDING SOURCE**
- National
  - Energy Surcharge Fund
  - National Innovation Fund
  - Public Procurement Budget
  - F-gas "credits"
  - Manufacturer Funds
- Multilateral
  - GCF, GEF, CTCN
  - MLF
  - MDBs
- Bilateral
  - IKI, IK-German, EU Facility, Switch, ETC

**INSTRUMENTS**
- Grant
  - R&D / Innovation
  - Incremental Costs Production Conversion Facility
  - Green Public Procurement
  - Top Label Grants/Incentive
  - On-bill Financing/Exchange Programs
  - Risk-sharing loan Facilities – Top label EE/Low GWP refrigerants
- Debt
  - F-gas Quota System
  - Take-back EPR Schemes
  - Equity Facilities/ESCO

**RECIPIENTS**
- Manufacturer
  - Production Conversion: Refrigerant
  - Production Conversion: Energy Efficiency
- Reseller
  - Manufacturer Outlets
  - Department Stores
- End User
  - Households
  - Government Users
  - Corporate Actors
  - Project Developers

Coordinating finance for sustainable refrigeration and air conditioning
The financing and potential criteria are divided into three major aspects:

- **RAC Mitigation target and type**;
- **Targeted national benefits**, three sub-sections:  
  • development (co-)**benefits**,  
  • policy reforms;  
  • technology and market transformation;  
- choice of **financing instruments**.
## Type and target of mitigation action

<table>
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<tr>
<th>Financing Sources</th>
<th>National Finance</th>
<th>ODA</th>
<th>Climate Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing mitigation</td>
<td>★★★</td>
<td>★★★</td>
<td>★★★</td>
</tr>
<tr>
<td>HFC mitigation</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>Other F-gases (non HFC) &amp; Disposal</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>Energie efficiency</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>Building efficiency</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>MEA Compliance requirements</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>Supporting MRV capability</td>
<td>★</td>
<td>★</td>
<td>★</td>
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Source: GIZ, 2018

Coordinating finance for sustainable refrigeration and air conditioning
## Integrating national development goals with climate action

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<tr>
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<td>Private</td>
<td>Domestic</td>
<td>Commercial</td>
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<tr>
<td><strong>Financing Co-Benefits</strong></td>
<td>⭐⭐</td>
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<tr>
<td>ODA capability</td>
<td>⬜️</td>
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<tr>
<td>Co-Benefits/Integrated Action</td>
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<td>⬜️</td>
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<td>Consumer benefits</td>
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<td>⬜️</td>
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<tr>
<td>Food security/health</td>
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<td>⬜️</td>
<td>⬜️</td>
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<tr>
<td>Education/capacity building</td>
<td>⬜️</td>
<td>⬜️</td>
<td>⬜️</td>
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<tr>
<td>Job creation/local employment</td>
<td>⬜️</td>
<td>⬜️</td>
<td>⬜️</td>
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<tr>
<td>Informal sector integration</td>
<td>⬜️</td>
<td>⬜️</td>
<td>⬜️</td>
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<tr>
<td>Increase local manufacturing</td>
<td>⬜️</td>
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Source: GIZ, 2018
## Financing policy measures

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<tr>
<td>Financing Policy action</td>
<td>—</td>
<td>★★★★☆</td>
<td>★</td>
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<tr>
<td>Sector wide approach</td>
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<td>★</td>
<td>★</td>
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<tr>
<td>NDC Process support/capacity Building</td>
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<td>★</td>
<td>★</td>
</tr>
<tr>
<td>Policy reforms &amp; rationalisation</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Standard and Norms development</td>
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<tr>
<td>Public Procurement</td>
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<td>★</td>
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<tr>
<td>Trade balance/dependencies</td>
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<td>★</td>
<td>★</td>
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<tr>
<td>Green growth strategies</td>
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Source: GIZ, 2018
## Technology and market transition

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<td>Bilateral</td>
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<td>NAMA Facilities</td>
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<thead>
<tr>
<th>Market &amp; technology transitions</th>
<th>Leverage of quality products/services</th>
<th>Price reductions</th>
<th>Competitiveness/business resilience</th>
<th>Capacity/skills development</th>
<th>Technical assistance Engineering</th>
<th>Materials Production/Refinement</th>
<th>Manufacturing conversion/qualification</th>
<th>Procurement support</th>
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Source: GIZ, 2018
Thank you for your attention!
Back-up slides
Summary

• Highly efficient technologies are available from major producers covering > 90% of world market.
• Past retail price predictions on EE costs generally overestimated by > 10 times, average price for incr. appliance efficiency dros in 2 years below the predecessor technology, specifically for AC
• Availability depends on demand, changes in retail mark-ups and economies of scale
• Market is very effectively investing, where progressive policies are in place
• Overwhelming majority of A5 countries are importers and have policies in place
• Even though, macro economic benefits are obvious, in Africa and some LVCs policies are lagging because of local administrative capacities, infrastructure and access to global markets
• Increasing demand vs. energy efficiency sufficient to maintain CO2 at present levels, but not sustainable in view of 2050 targets and beyond (near zero emission)
• Additional measures needed for replacing existing with sustainable technologies, avoiding lock in of interim technologies and define time frames for major step changes
• Serving sector can be most effective in reducing CO2 emissions of the entire existing stocks.