Green Public Procurement Technical Guidelines and Specifications for Energy Efficient Cooling

24th March 2022

Miquel PITARCH & Soledad GARCIA, United for Efficiency

Supporting Countries to Save 20% of their Electricity

By accelerating the Global Transition to **much more energy efficient lighting and appliance technologies** by strengthening country capacities around the world, as well as ensuring environmentally sound management practices. Building synergies among stakeholders, sharing knowledge and information, helping create strategic policy and regulatory frameworks, and addressing technical and quality issues.

Electric Motors

Light Bulbs

Residential Refrigerators

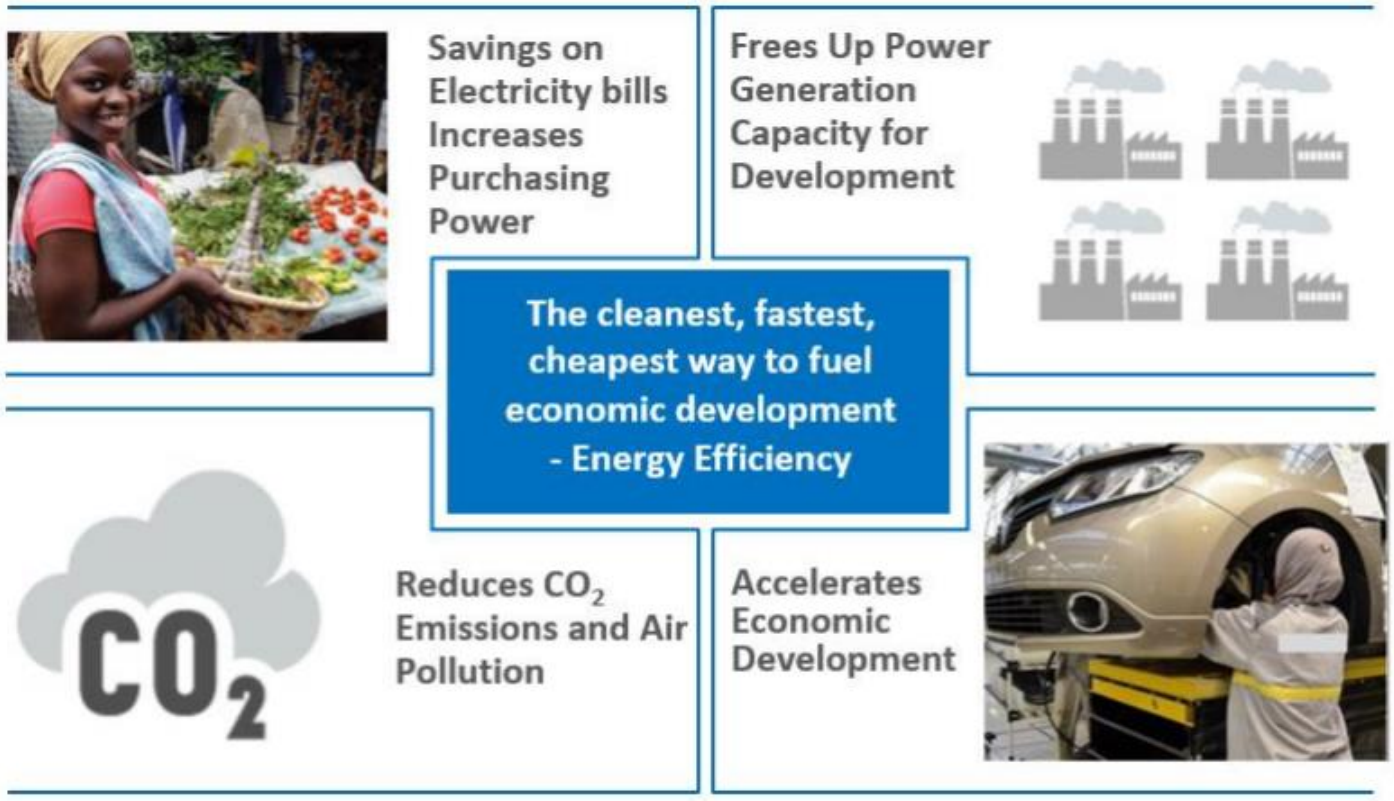
Room Air Conditioners

Distribution Transformers

OUR MISSION:

Support the second goal of the UN Secretary General's SE4ALL initiative: to **double the global rate** of improvement in energy efficiency by providing assistance to developing countries and emerging economies to **move their markets to energy-efficient appliances and equipment**.

WHY ENERGY EFFICIENCY?

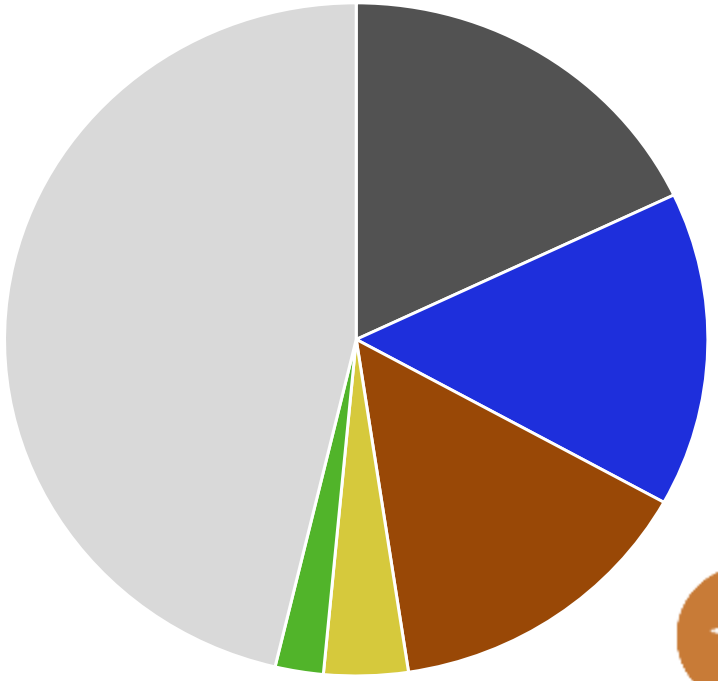


A global transition to high efficiency products will make possible:

- ✓ for people to enjoy the benefits of their increased incomes,
- ✓ for governments in reaching their economic and environmental ambitions.
- ✓ Minimize the impact on climate change and contribute towards meeting the 2°C climate target

HOW DO WE FULFILL OUR MISSION?

WE TACKLE THE 5 PRODUCTS THAT USE MORE THAN 50 % OF GLOBAL ELECTRICITY:



Room Air Conditioners
- Can improve efficiency by 30%

Indoor & Outdoor Lighting
- Can improve efficiency 40 - 60%

Electric Motor Systems*
- Can improve efficiency 20 - 30%

Residential Refrigerators
- Can improve efficiency by 60%

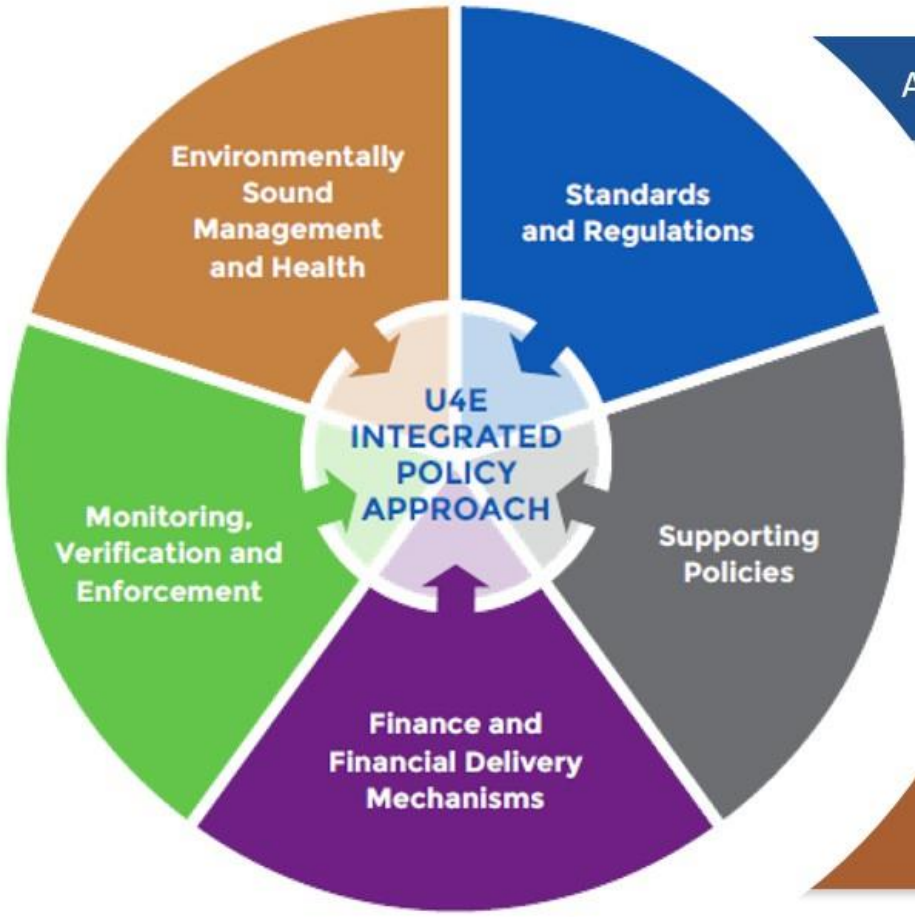
Distribution Transformers
- Can improve efficiency by 30%

- We inform policy makers of the potential environmental, financial and economic savings of a transition to high-efficiency products
- We identify and promote global best practices in transforming markets
- We offer tailored assistance to governments to develop and implement national and regional strategies and projects to achieve a fast and sustainable market transformation

U4E United for Efficiency

HOW DO WE FULFILL OUR MISSION?

U4E implements a proven *Integrated Policy Approach* for product market Transformation



Adopt minimum energy performance and internationally-recognized test standards

Ensure effective labels are in place and that appropriate consumer information and advice is available

Consider a blend of financing mechanisms and incentives to help offset the incremental costs of energy-efficient products

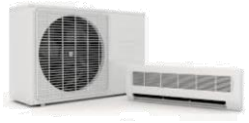
Include legal authority, enforcement powers, capacities and penalties in the national legal and enforcement frameworks;
Use a product registration system as an initial compliance gateway

Provide for Materials Recovery (e.g. glass, ferrous and nonferrous metals and phosphors including any mercury in lamps and refrigerant gases).

STANDARDS, LABELLING, GREEN PUBLIC PROCUREMENT AND MARKET BASED INCENTIVES WORK

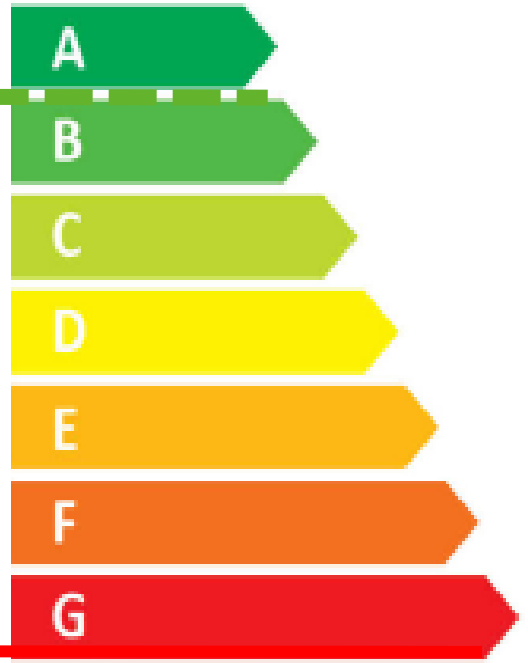
Energy Efficiency of Products in the Market

Offer incentives support the adoption of the best products (e.g. rebates, financing, bulk buy discounts)



Promote efficient products (e.g. labels and awareness campaigns to help buyers understand EE benefits)

Minimum Energy Performance Standards (MEPS) ban the worst products



Monitor the market for MEPS compliance, test the products and enforce the rules

+

ESM for Recycle & dispose old products in a sustainable way

WITH WHOM WE WORK- Project Partners

MANUFACTURERS & INDUSTRY ASSOCIATIONS

OSRAM, SANHUA, International Copper Association (Copper Alliance), GREE, Electrolux, mabe, B/S/H/, arçelik, Whirlpool Corporation, Signify, ABB

TECHNICAL ORGANISATIONS & INITIATIVES

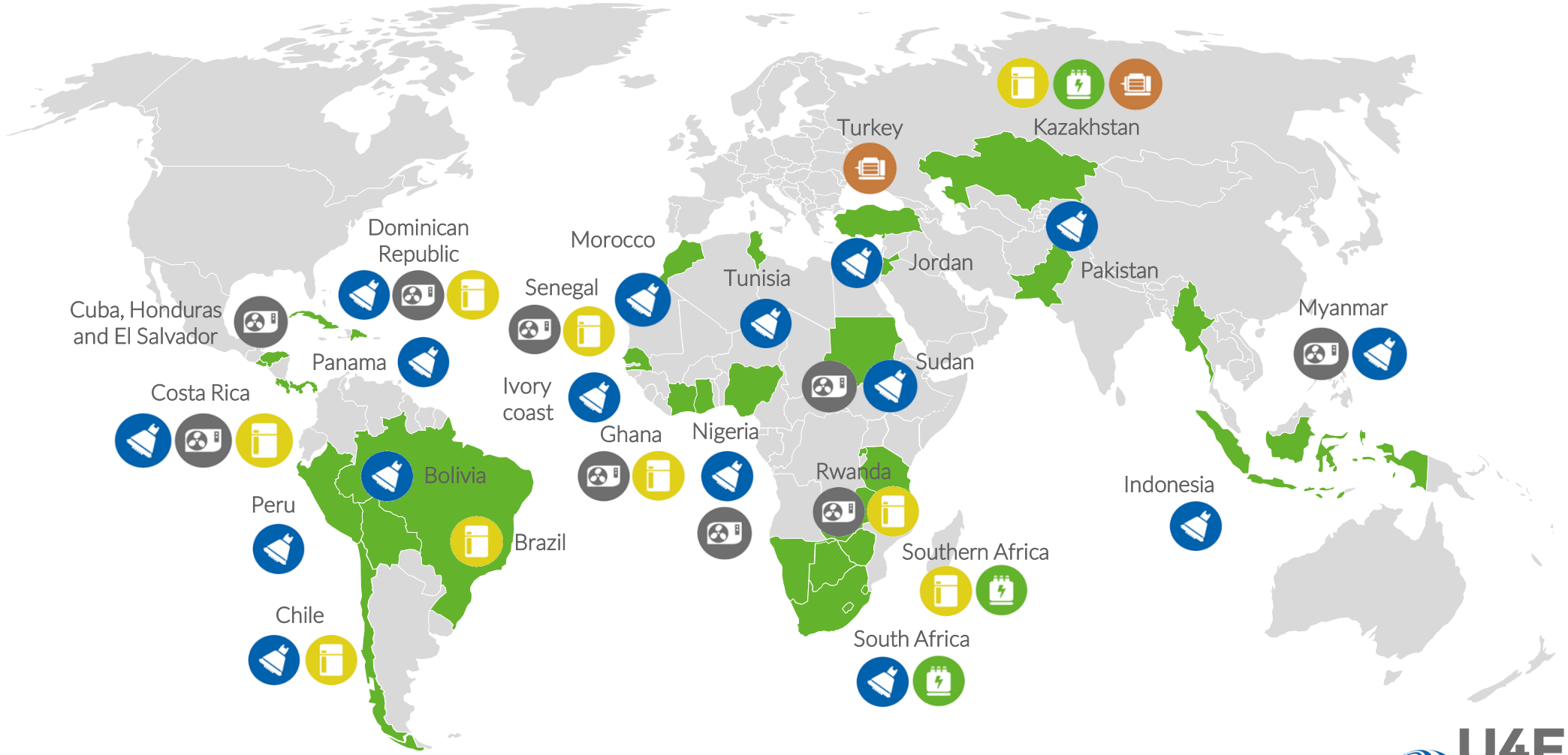
BERKELEY LAB, olade, Copenhagen Centre on Energy Efficiency (SE4ALL EE HUB), SACREEE (SADC Centre for Renewable Energy & Energy Efficiency), RCREEE (Regional Center for Renewable Energy and Energy Efficiency), EACREEE (Building a Sustainable Energy Future), giz, clasp, African Energy Commission, NRDC, GELC, CARBON TRUST, IIEC (International Institute for Energy Conservation), BASE, AMBILAMP, ASEAN Centre for Energy (ACE), topten, EESL, 4E, NIS

FUNDERS, FINANCIERS & IMPLEMENTING AGENCIES

UN environment (United Nations Environment Programme), UNDP, gef, KIGALI COOLING EFFICIENCY PROGRAM, Banque Africaine de Développement (African Development Bank), Sida (Swedish International Development Cooperation Agency), GREEN CLIMATE FUND, GLOBAL CLIMATE PARTNERSHIP FUND (managed by responsAbility), DEVELOPMENT BANK OF RWANDA (www.brd.rw), BRD (We empower you)

NATIONAL level – Where do we work?

U4E National Projects



U4E United for Efficiency

WHERE DO WE WORK – U4E Scope of Work:

U4E provides support at various levels

GLOBAL

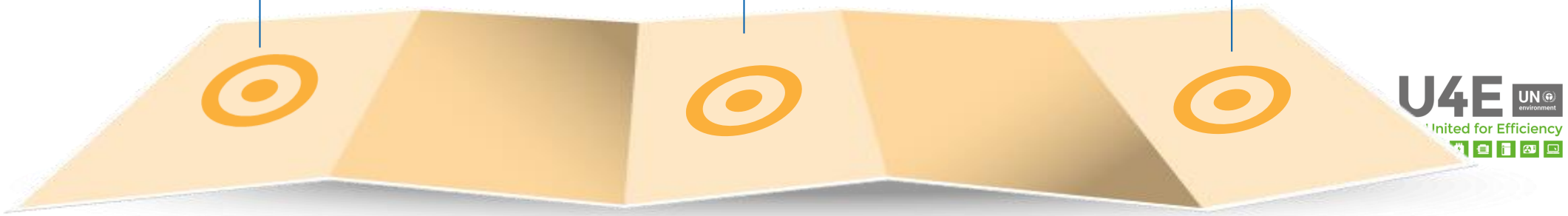
- 155 Country Savings Assessments
- 6 Policy Guides
- 5 Model Regulation Guidelines
- Product Registry System
- Communications and outreach
- www.united4efficiency.org

REGIONAL

- Regional Market Assessments
- Regional Capacity Building for Policy Makers
- Regional Harmonization Projects.

NATIONAL

- National Strategies
- National Training for Policy Makers and Practitioners
- Implementation Technical Assistance
- Project development and Fund rising support



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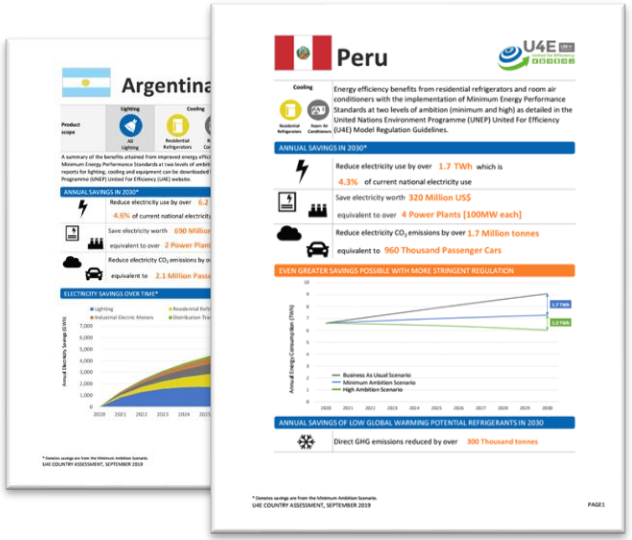
U4E Tools and Resources

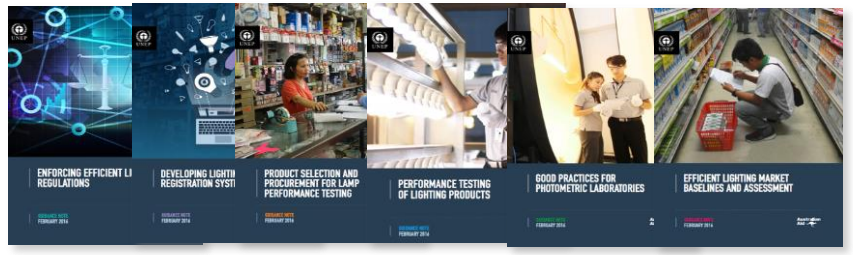
+155 Country Saving Assessment



Procurement Guidelines and Financial Mechanisms Guide

5 Policy Guides

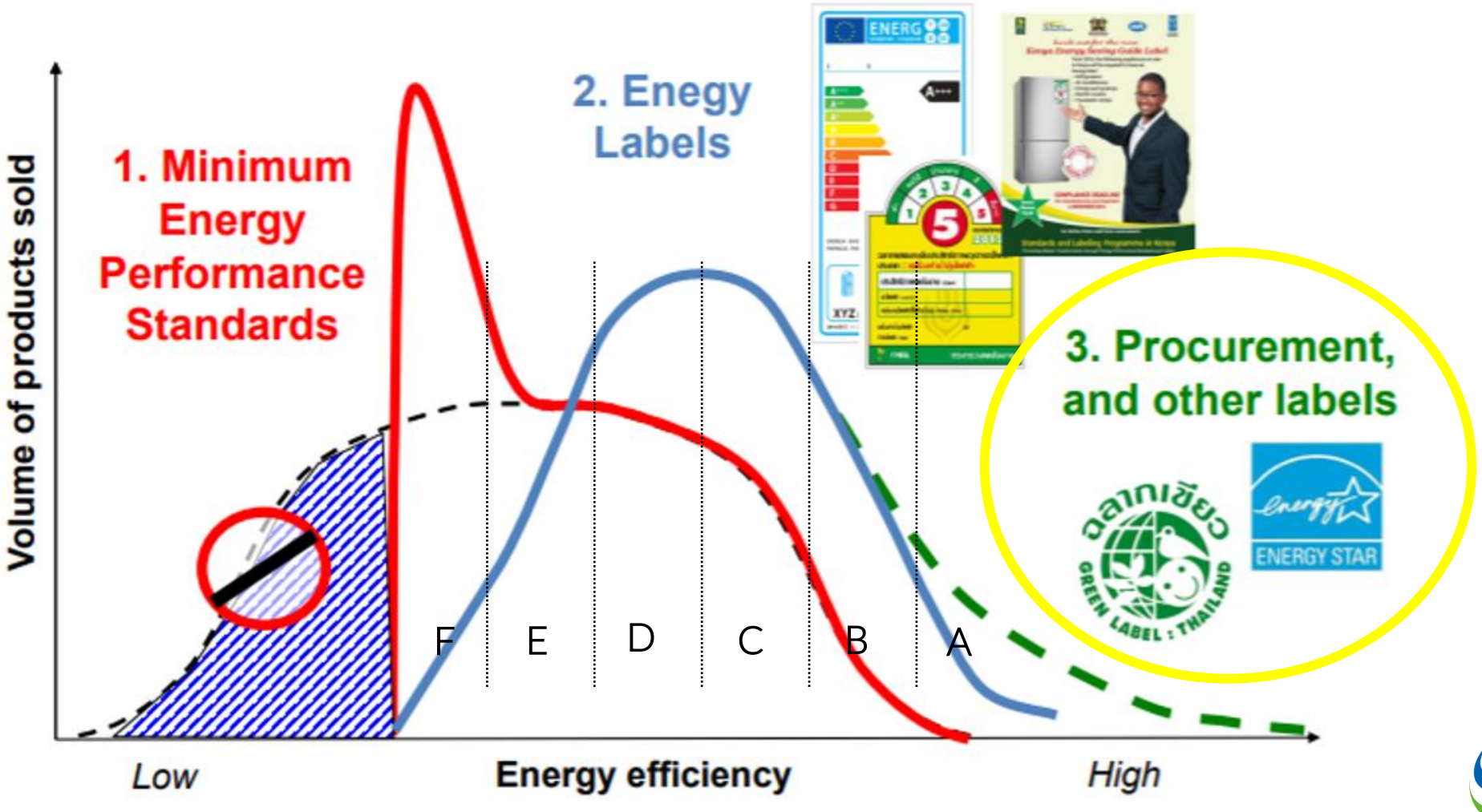
Monitoring and Verification Guides



Model Regulation Guidelines

Supporting Guidelines

The role of SPP on the Market Transformation Process



U4E United for Efficiency

Sustainable Public Procurement Guidelines

- **Intended for:** Public Procurers, Lighting and Cooling Technical Personnel, Policy Makers and related officers involved in procurement activities.
- **Scope**

Lighting

Office/large buildings lighting (LED luminaires and LED tubes) and all street/outdoor lighting luminaires.

Refrigerator appliances

Domestic refrigerators and freezers, commercial/ professional refrigeration appliances, vending machines and laboratory grade refrigerators.

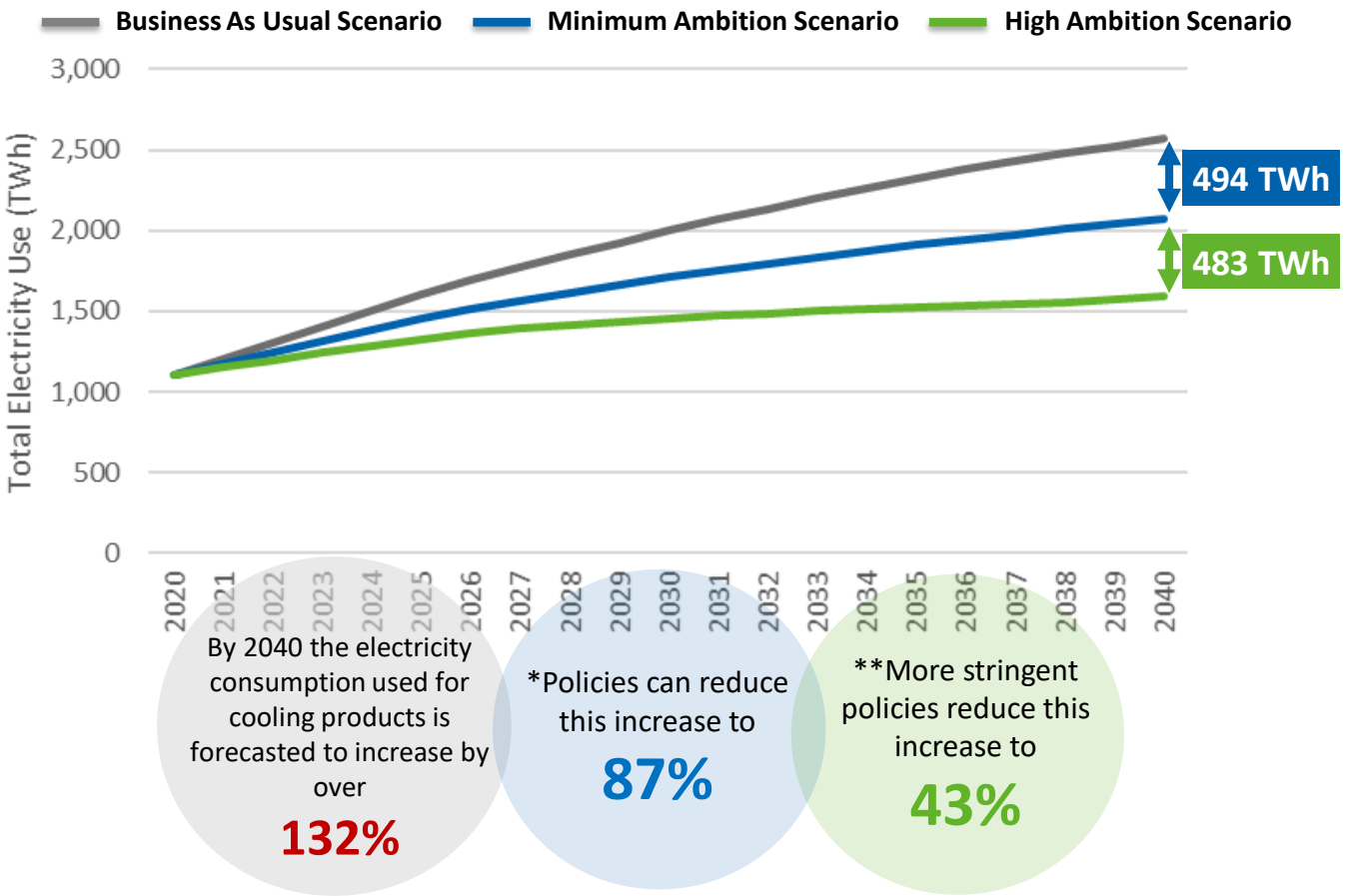
Room air conditioners

Portable air conditioners, split air conditioners (single and multi-split), window air conditioners and ducted air conditioners.

- **Additional U4E Resources for GPP:**
  - ✓ **Toolkit:** Key sustainable considerations (environmental, social and economic), current barriers for its deployment (financial, awareness, capacity and regulatory), Economic analysis of delivery models and overall recommendations for the tendering process.
  - ✓ **SPP Excel Spreadsheet Tool:** Compares the economic cost and environmental impact of different bids during the life span of the appliances. SPP minimum requirements on energy efficiency and refrigerant GWP can be used to easily check the compliance of each bid.

Savings Potential of Higer Efficiency Cooling

Savings Potential of Refrigerators and Room Air Conditioners by 2040*



Savings in 2040*	Annual	Cumm
Electricity savings (TWh)	494	5,770
Equivalent to:		
Power stations [500 MW]	225	N/A
Million tonnes of CO_2	500	5,900
Billions of USD in electricity bills	42	480

* Minim Ambition Scenario Savings. It refers to the 28 countries from the Asia-pacific region that had been assessed for the U4E Country Saving Assessments.
(Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka, China, Democratic People's Republic of Korea, Mongolia, Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam)

For more information on each countries´ Savings Assessment, please visit:
https://united4efficiency.org/countries/country-assessments/

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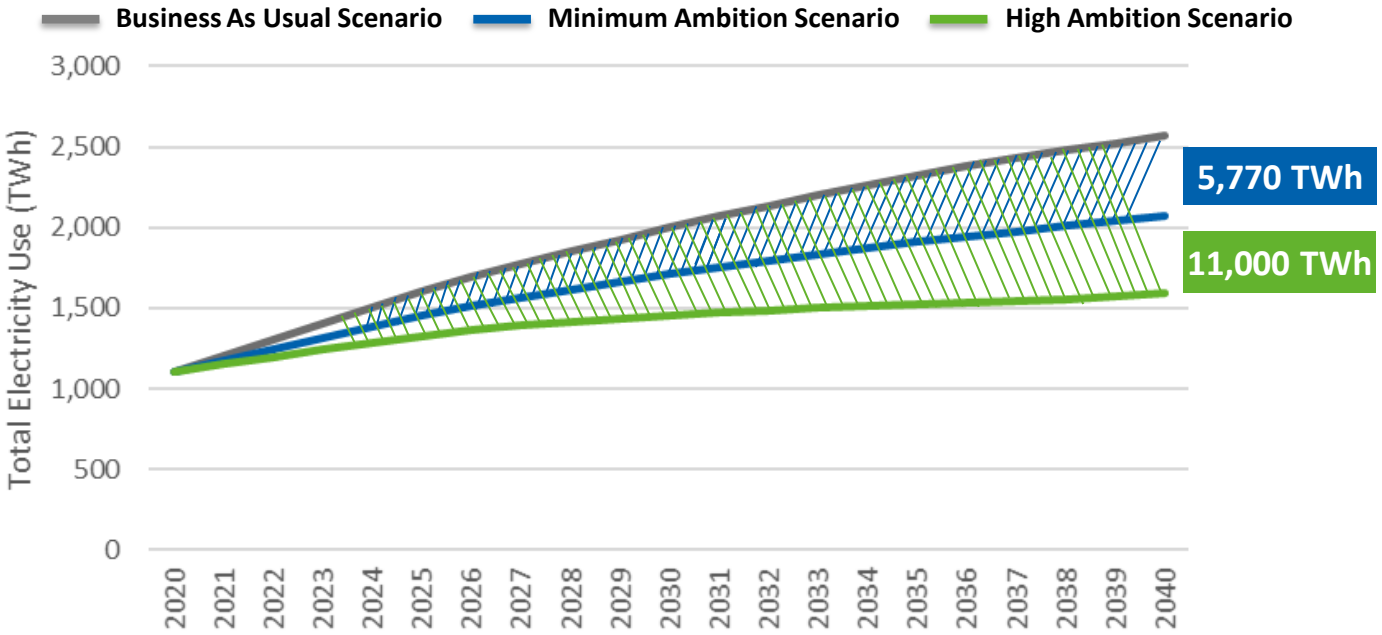

Cumulative Savings in 2040*

Electricity savings (TWh)	**11,000**
Equivalent to:	
Power stations [500 MW]	**N/A**
Million tonnes of CO_2	**11,500**
Billions of USD in electricity bills	**920**

* High Ambition Scenario Savings. It refers to the 28 countries from the Asia-pacific region that had been assessed for the U4E Country Saving Assessments (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan, Sri Lanka, China, Democratic People's Republic of Korea, Mongolia, Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam)

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Content of U4E´s Green Public Procurement Technical Guidelines for Energy Efficient Refrigerators and Room Air Conditioners

Green Public Procurement

Model

Cohesive model for Green Public Procurement

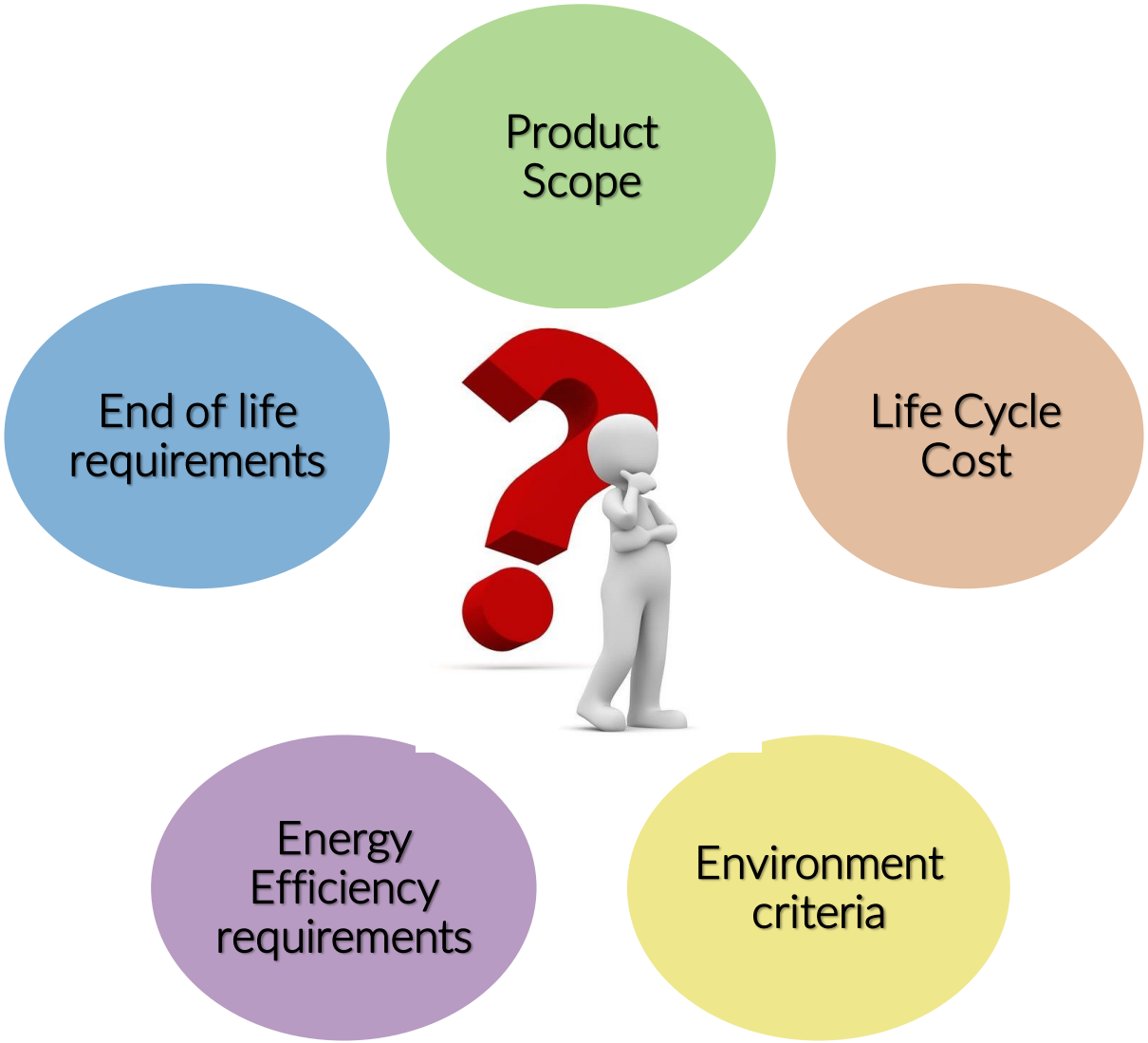
Legislative framework
- International: NDC, Kigali, etc.
- National: Finance and public procurement

Financing and acquisition models
- “Normal” allocation in budgets
- Alternative models

Green requirements
- Product: mainly environmental
- Supplier: social, environmental, economical, …

Additional factors
- Additional social benefits
- Political acceptance and support

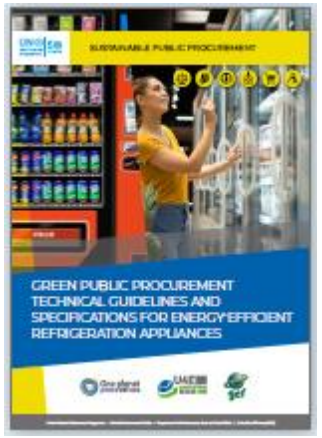
Questions arising when defining requirements for GPP



Green Public Procurement Guideline Content:

Cooling

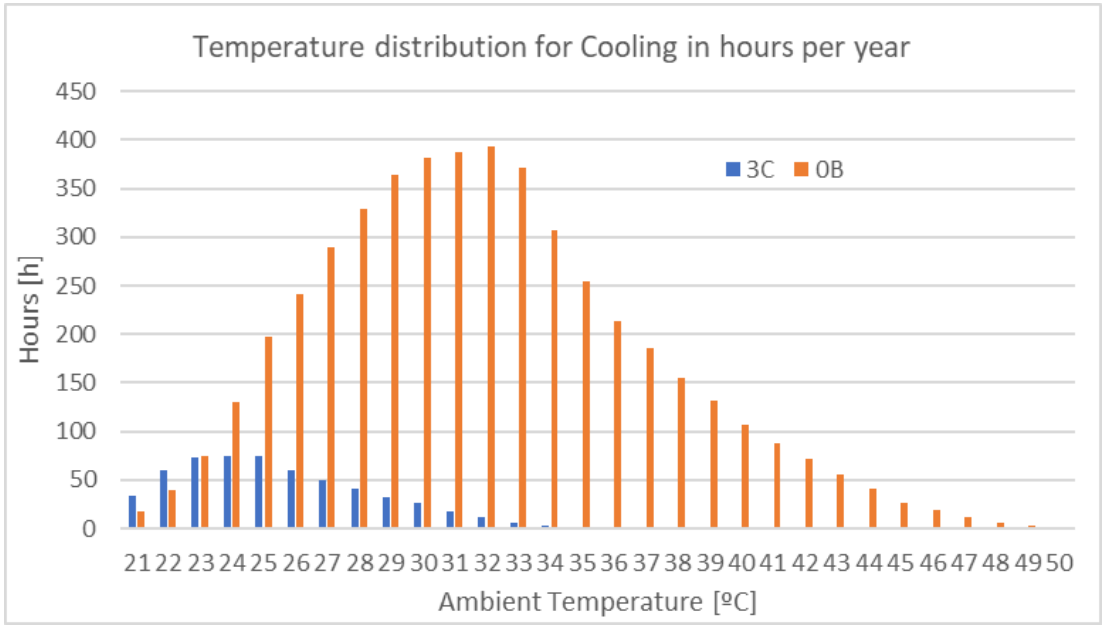
- Type and Size
- Energy Efficiency
- Occupancy and Temperature Controls
- Refrigerants
- Sound Power level
- Safety
- Reparability and Warranty
- Environmental Sound Management



- Energy Efficiency
- Lifetime
- Volume
- Refrigerants
- Food Preservation
- Smart Controls and Lighting
- Reparability and Warranty
- Environmental Sound Management

1. Energy consumption: Energy Efficiency

- Does the country have energy efficiency regulations for the selected product?
  - ✓ MEPS, comparative and endorsement labels, …
- Are these regulations being updated frequently?
- Do we know the energy efficiency shared in the market?
- Which metric is used to calculate energy efficiency?
  - ✓ Single point (EER) vs. Seasonal Performance (SEER, CSPF, …)
  - ✓ Hours of use vs. ambient temperature
  - ✓ System capacity

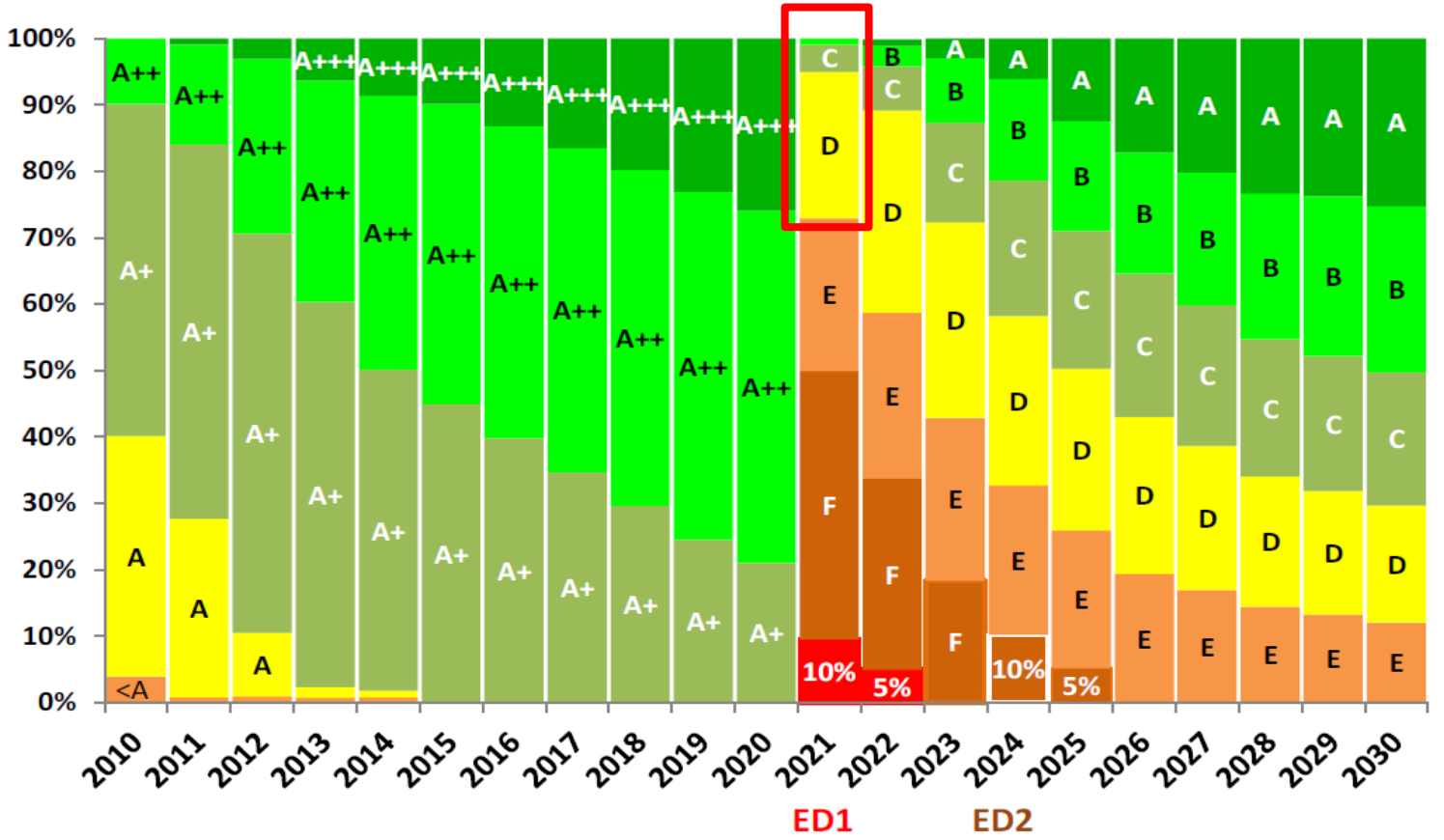


Capacity Range	High Efficiency Climate 3C	High Efficiency Climate 0B
0 to 4.5 kW	7.9	5.9

1. Energy consumption: Energy Efficiency

- Green Public Procurement should target the most efficient products in the market
  - ✓ **Around 20% top efficient products**

- Example of using energy labels in the GPP requirement



Source: Draft EU regulation for domestic refrigerators

1. Energy consumption: Other requirements

- **Do not oversize** the AC system
- **Improve energy efficiency of building** by reducing the need of air conditioning
  - ✓ Better insulation (wall, window, roof, …), reduce radiation through windows, etc.
- Be careful with the metrics used to calculate energy efficiency
  - ✓ If EER is used, the comparison between fix and variable speed is not fair → **Variable speed usually consume less energy**
  - ✓ **Portable ACs usually consume more energy** (for same capacity), but this might not be reflected in the energy efficiency labels
- Occupancy and temperature limiting controls
  - ✓ **Presence or schedule controls** to reduce energy consumption
  - ✓ Limit control temperature within comfort range
- Reversible units might be considered when heating is needed
  - ✓ **A heat pump uses ¼ of energy compared electrical resistance heater** (depending on climate)

2. Refrigerant

- All ACs should use refrigerants with 0 (zero) ODP
- The limits of GWP will depend on the size of the AC and the available products in the country. Typical refrigerants used in ACs
  - ✓ R290 (natural HC) → GWP = 3
  - ✓ R32 (HFC) → GWP = 675
  - ✓ R410A (HFC) → GWP = 2088
- Refrigerants with GWP below 750 are usually available for most sizes of ACs
- Some countries have ACs available working with natural refrigerants for capacities below 6 kW
  - ✓ In these cases, a limit of GWP<150 or lower can be used for this capacity range
  - ✓ Natural refrigerants are preferred to HFO even if they have similar GWP
- Refrigerants leaks might cause more emissions and decrease efficiency
  - ✓ Proper installation and maintenance by qualified technicians

3. Product durability

- Some economies, such as Europe, include durability requirements in all products entering the market
- **Reparability → Suppliers guarantee the supply of essential spare parts** during the lifespan of the product
  - ✓ Compressor, heat exchangers, circuit boards, fan motors
- **Access to repair and maintenance information**
  - ✓ Technical instructions for repair, wiring and connection diagrams, relevant information for ordering spare parts, etc.
  - ✓ Correct installation and maintenance
- **A minimum warranty period of one year** after the date of purchase.
  - ✓ **Other parts** of the equipment might be guaranteed for at least **3 years** (e.g., compressor, heat exchanger, control board, thermostat, fan, motor, controls, etc.)

4. Environmentally sound management

- **Minimize the adverse effects** that may result from end of life of the product (**materials and refrigerant**) → reduction, reuse, and recycling

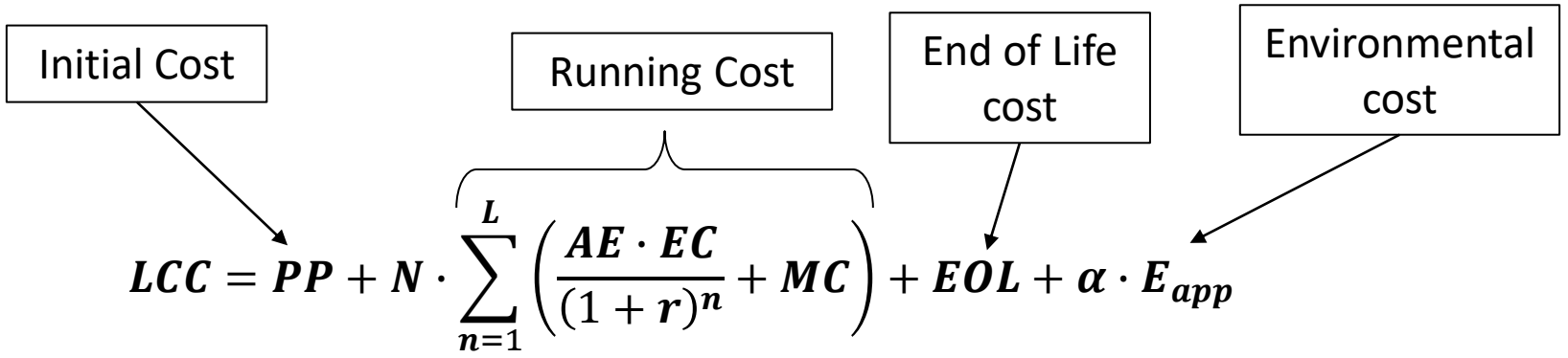
→ ESM Considerations to take into account:

- For **countries with EPR scheme**, the management system to which the **seller/supplier** is attached for the product (ACs) **will be responsible for their collection and recycling / treatmen**t
  - ✓ The **buyer must verify that there are no exceptions**, for instance with EPR certificates or treatment certificates

- For **countries without EPR scheme**, **the buyer is responsible for the treatment** at the end of life → proper treatment should be required
  - ✓ **Appropriate treatment can be agreed with supplier** → include conditions in the biding rules

5. Life Cycle Cost (LCC)

- **Considers the cost during the whole life of the product**
- Can be used to decide between bids that comply with minimum requirements



- AE → Annual energy consumption
- EC → Energy Cost
- L → Lifespan in years
- MC → Maintenance cost
- r ≈ 1 if similar discount rate and escalation rate of electricity
- Eapp → Emissions in equivalent tonnes of CO2
- α → environmental cost in $/tonne of eq. CO2

5. Life Cycle Cost (LCC)

- U4E has developed an Excel tool to compare between bids
  - ✓ Life Cycle Cost comparison
  - ✓ Life Cycle Emissions comparison
  - ✓ Early replacement analysis
- Global Tool → Can be adapted by country to simplify use

Bid code	Number of units	Capacity per unit [kW]	Energy efficiency for cooling CSPF [kWh/kWh]	Minimum energy efficiency requirement	Meets Energy requirements?	Unitary Cooling Seasonal Energy Consumption (CSEC) in kWh per year	Special controls to reduce energy consumption? [Yes/No]	Expected savings for special controls in %	GWP for refrigerant	Refrigerant charge per unit (kg)	Meets fluid requirements?
1	100	7.00	8.50	7.60	YES	2,300	Yes	20%	675	0.1	YES
2	100	7.00	7.80	7.60	YES	2,500	No		3	0.1	YES
					-						-
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Note: The table below can be used to calculate the Payback and balance cost and emissions due to early replacement. It considers the emissions of production and distribution of new appliances.

Compare with Bid code	Number of units	Energy efficiency for cooling CSPF [kWh/kWh]	Unitary Cooling Seasonal Energy Consumption (CSEC) in kWh per year	GWP for refrigerant	Refrigerant charge per unit (kg)	Discounted Payback Period Cost (years)	Payback Period for CO2 emissions (years)	Expected years left for old appliance	Balance cost for early replacement [USD]	Balance emissions for early replacement [kg CO2 eq]
						-	-		-	-
						If the number is negative, or shows an error, the				

KNOW MORE ABOUT U4E AND JOIN US:

Check our websites

Find out tools, policy guides and policy briefs, webinars, model regulations, country assessments and news releases on our official website.

http://united4efficiency.org/

U4E introduction video

Need a quick introduction to our project? Our three minute general video is at:
EN http://united4efficiency.org/accelerating-the-transition-to-_high-efficiency-products/

GPP Technical Guidelines and Specifications

Check U4E´s GPP Technicial Guidelines at:
https://united4efficiency.org/resources/publications/


WE NEED MORE
ENERGY EFFICIENCY
TO COOL THE WORLD
U4E
United for Efficiency
UN environment

Contact

TRANSFORMING MARKETS TO ENERGY-EFFICIENT PRODUCTS

Thank you

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