

Saudi Energy Efficiency Program

Presentation to Green & Efficiency Building Workshop

Agenda

- **Saudi Energy Efficiency Program**
- Buildings sector fact-base
- Insulation enforcement in new buildings

SEEC is the custodian of demand-side energy efficiency in the Kingdom



Description

- Established through Council of Ministers in 2010
- Temporary institutional setup under King Abdul-Aziz City for Science and Technology (KACST)
- Board of Directors chaired by KACST president

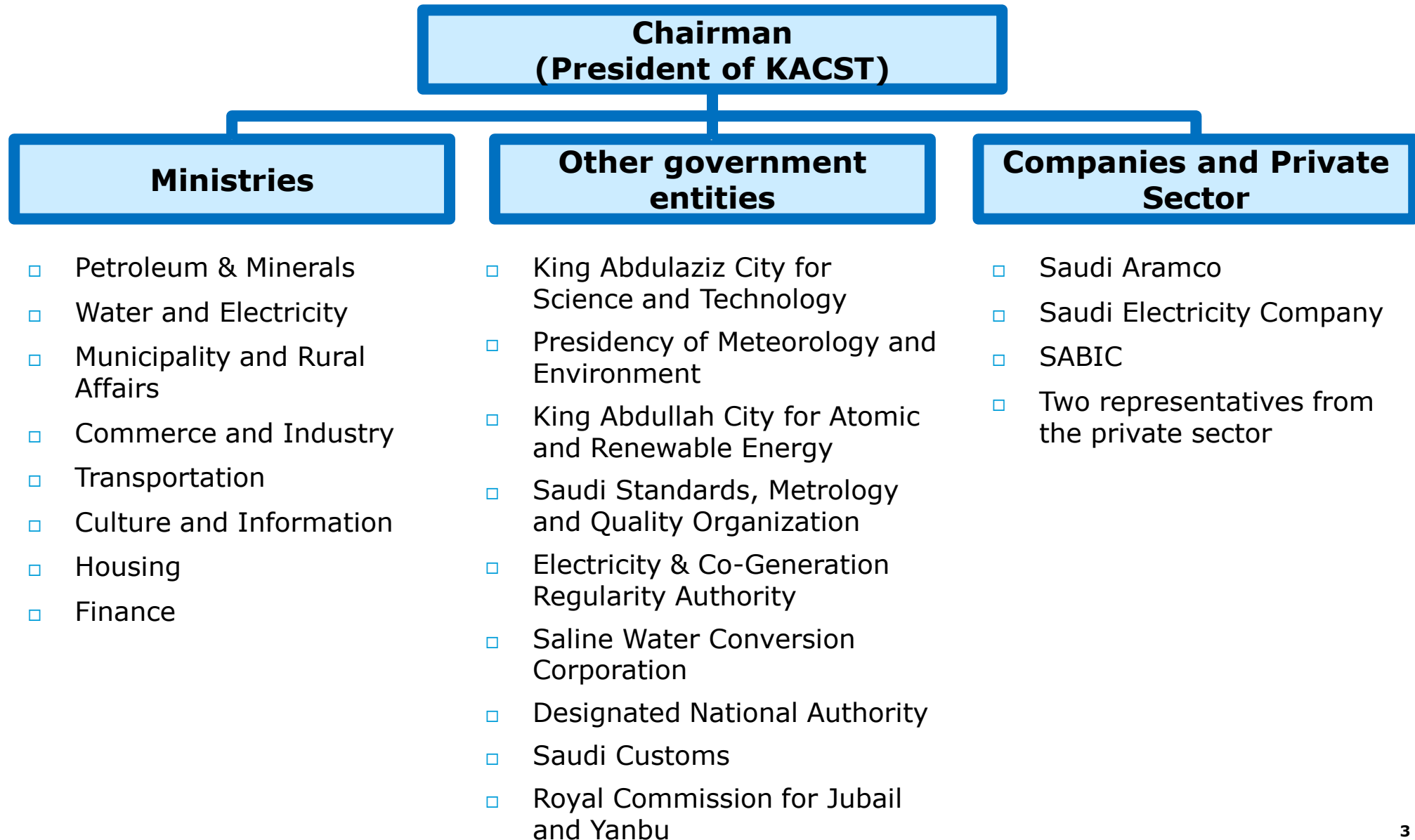
Mission

- Improve Saudi Arabia energy efficiency and coordinate all activities between stakeholders

Key objectives

- Develop energy efficiency program
- Propose energy efficiency policies and regulations, and monitor their implementation
- Promote awareness
- Participate in the implementation of pilots

SEEC has a broad governing board with key stakeholders represented



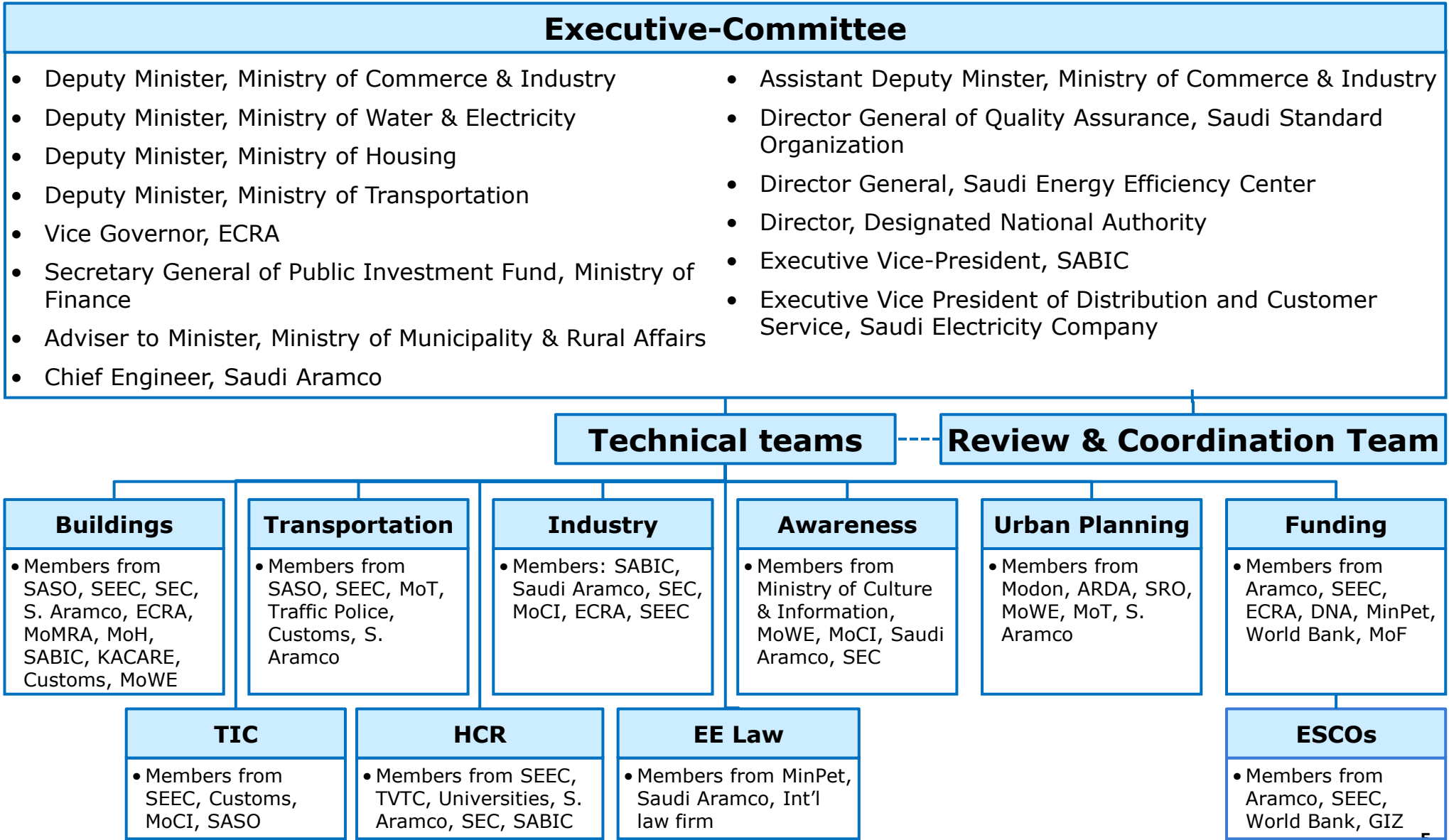
SEEC launched the Saudi Energy Efficiency Program in 2012



The Saudi Energy Efficiency Program (SEEP)

- SEEP's scope is focused on demand side only with 3 sectors (buildings, transport, and industry) covering 90+% of Saudi Arabia's internal energy consumption
- SEEP's objectives are:
 - To improve Saudi Arabia's energy efficiency using bottom-up designed initiatives and their enablers
 - To involve all stakeholders from inception (government, businesses and the public)

SEEP has mobilized 150+ engineers from 20+ organizations with a high-level Executive-committee to steer the effort



SEEP has been an inter-government effort involving all stakeholders



**Ministry of Petroleum
& Mineral Resources**



**Ministry of
Municipality &
Rural Affairs**



**Ministry of Water
& Electricity**



**Ministry of Commerce
& Industry**



**Ministry
of Housing**



**Ministry of
Finance**



**Ministry of
Transportation**



**Ministry of
Communication &
Information**



**Electricity &
Co-generation
Regulatory Authority**



**Saudi Standards,
Metrology
and Quality
Organization**



**Saudi
Customs**



**ArRiyadh
Development
Authority**



**Saudi Energy
Efficiency
Center**



**King Abdulaziz
City for Science
and Technology**



**Designated
National Authority**



**Saudi Industrial
Development
Fund**



**Saudi
Council of
Engineers**



**Saudi Building
Code Nat'l
Committee**



**Traffic
Police**



**Saudi Industrial
Property Authority**



**Royal Commission
of Jubail & Yanbu**

Royal Commission for
Jubail and Yanbu (RCJY)
الهيئة الملكية للجبيل وينبع



**Saline Water
Conversion
Corporation**



الشركة السعودية للكهرباء
Saudi Electricity Company



أرامكو السعودية
Saudi Aramco

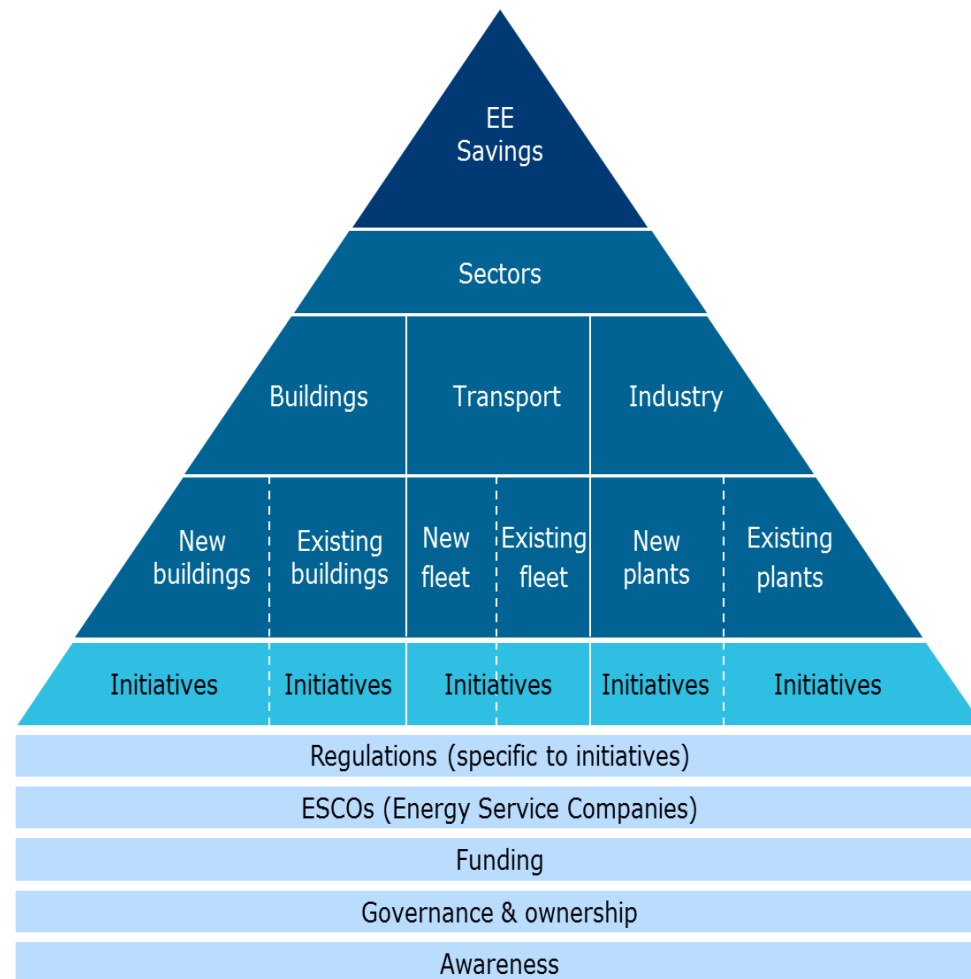


SEEP's guiding principles and framework

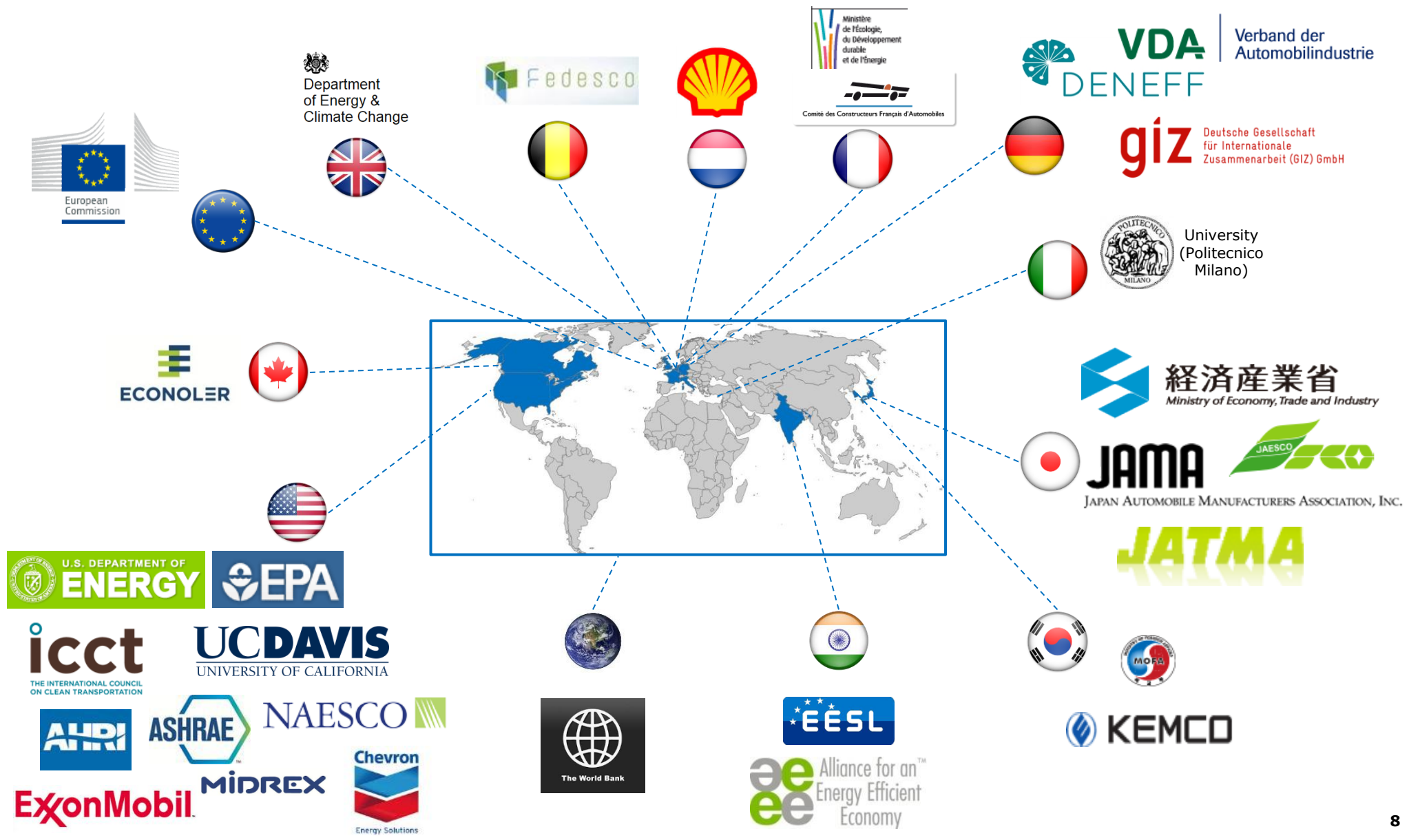
There are four guiding principles for SEEP

- 1 Purely focused on **demand-side** management
- 2 Program design **does not include price reforms**
- 3 Initiatives designed based on **end-user impact** (e.g. payback period)
- 4 Energy Efficiency initiatives based on **consensus** with government and private sector stakeholders

SEEP framework is organized around three sectors and five enablers



SEEP continues to partner with foreign governments and international organizations



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- **Buildings sector fact-base**
- Insulation enforcement in new buildings

Buildings sector team

GOVERNMENT ENTITIES WORKING WITH SEEP

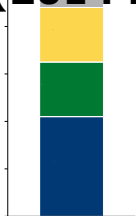
- Ministry of Water and Electricity
- Ministry of Housing
- Ministry of Municipalities and Rural Affairs
- Ministry of Commerce and Industry
- Electricity and Cogeneration Regulatory Authority
- Saudi Standards, Metrology and Quality Organization
- King Abdullah City for Atomic and Renewable Energy
- Saudi Energy Efficiency Center
- Saudi Council of Engineers
- Saudi Building Code National Committee
- Saudi Electricity Company
- Saudi Armco
- SABIC

SEEP BUILDINGS TEAM KEY ENGAGEMENTS

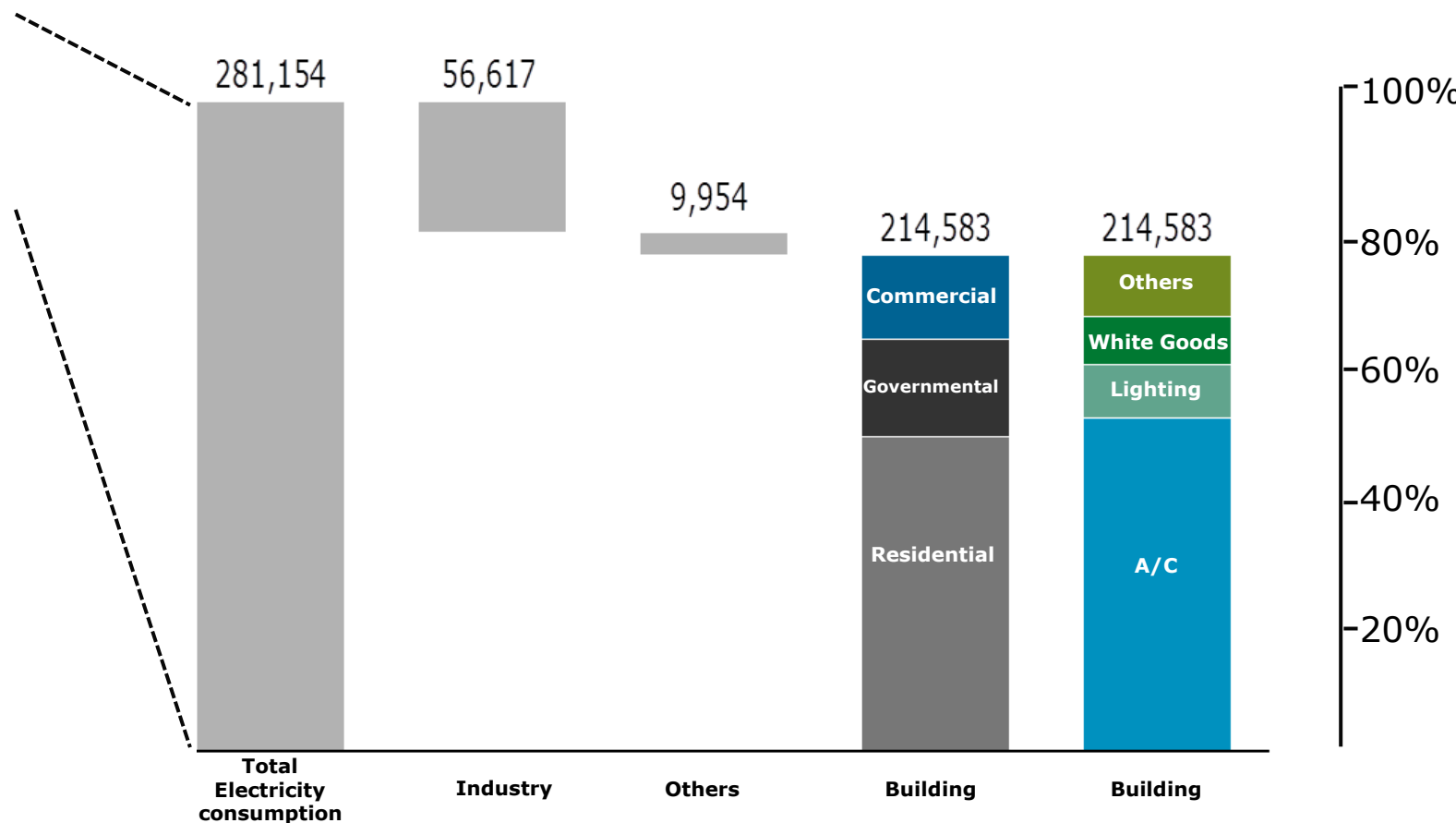
- 15 engineers meeting weekly since May 2012
- Several workshops carried out with 300+ participants:
 - Air conditioner workshop
 - Insulation workshop and Saudi Building Code section 601
 - A/C compressor workshop
 - Large capacity air conditioner workshop
 - Insulation workshops
 - Lighting workshop
- International experts and consultancies hired:
 - ASHRAE
 - AHRI
 - MILA
- Studies commissioned:
 - Buildings total footage area study
 - AC, lighting, and insulation market surveys

Buildings represented ~23% of the energy consumed with ~70%+ for cooling

**Primary energy consumption
(2014 breakdown)**



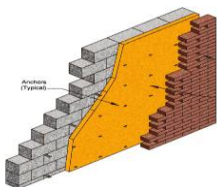
**Electricity consumption
(2014, GWh-year)**



Buildings key EE initiatives



- Updated the efficiency standard for small capacity air-conditioners to meet ASHRAE standards
- Developing an efficiency standard for large capacity air-conditioners



- Updated thermal insulation products standards
- Developed thermal insulation regulation for new buildings
- Improved the control process to ensure proper implementation



- Finalizing efficiency standard for residential lighting products
- Developing efficiency standard for commercial and street lighting products



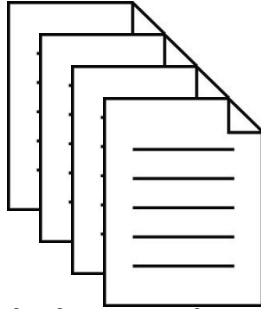
- Updated of the energy efficiency standards for refrigerators
- Updated of the energy efficiency standards for washing machines

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- **Insulation enforcement in new buildings**

Approach followed to insulate new buildings

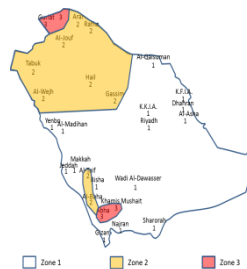
MATERIAL STANDARDS



- Updated thermal insulation material standards in collaboration with all private sector and government stakeholders for insulation products
- Ensuring the quality and reliability of thermal insulation products available in the Saudi market



REQUIREMENTS FOR NEW BUILDINGS



المعيار المحدد	المنطقة 1	المنطقة 2	المنطقة 3
الأسقف	0.275	0.228	0.202
الجدران	0.453	0.397	0.342
الأبواب المعزولة بظلال شمسية	2.839	2.839	2.839
الأبواب المعزولة بظلال شمسية من 12.5% من الجدران			
في المناخ الحار	2.668	2.668	2.668
SHGC: 0.25	SHGC: 0.25	SHGC: 0.25	
إضافة التظليل بظلال شمسية من 12.5% من الأجزاء			
في المناخ من 12.5% إلى 25%	4.259	4.259	4.259
SHGC: 0.35	SHGC: 0.35	SHGC: 0.35	SHGC: 0.35

- Updated the requirements in collaboration with all stakeholders and international experts
- Ensured requirements are achievable and applicable to the Saudi context

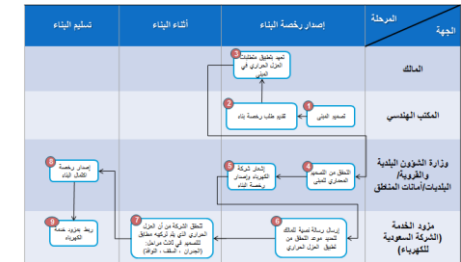


وزارة الشؤون البلدية والقروية



كود البناء السعودي
Saudi Building Code

ENFORCEMENT MECHANISM



- Established short-term enforcement mechanism leveraging current capabilities. Developing long-term enforcement mechanism by leveraging international best-practice
- Ensuring the application of thermal insulation in all new buildings in 24 major cities (phase 1)



وزارة الشؤون البلدية والقروية



الشركة السعودية للكهرباء
Saudi Electricity Company

SASO issued the Thermal Transmittance Values for Residential Buildings (SASO 2856/2014)

Issue the Thermal Transmittance Values

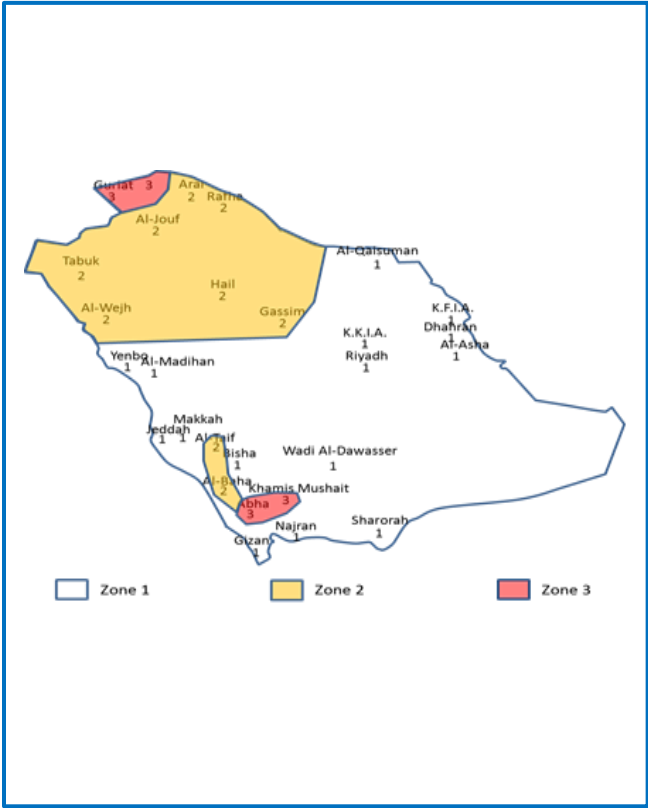
- Scope: Residential building (3 floors & below) applicable to:
 - New buildings, and
 - Modified and Renovated buildings.
- Redefined climate zones
- Two stage of enforcement

Review the proposed Insulation Values

- Work with ASHRAE to propose **Insulation Values** suites Saudi context (environment).
- Review the **Insulation Values** with:
 - SASO
 - Insulation Materials Manufacturers
 - Design Offices
 - International benchmark

The new thermal insulation regulation sets the minimum thermal resistivity requirements (U-values) for new low-rise residential buildings

Three Climatic zones



Building element	Stage 1: ~ November 2014			Stage 2: January 2017		
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3
Roofs	0.31	0.37	0.42	0.20	0.24	0.27
Walls	0.53	0.61	0.7	0.34	0.40	0.45
Vertical Glazing , 25% of wall	2.67 SHGC- 0.25	2.67 SHGC- 0.25	2.67 SHGC- 0.25	2.67 SHGC- 0.25	2.67 SHGC- 0.25	2.67 SHGC- 0.25

The thermal insulation products standards were updated in line with global benchmarks

SASO approved 13 insulation standards covering 10 insulation products:

- Extruded Polystyrene
- Expanded Rigid Polystyrene
- Spray-applied polyurethane foam
- Rigid polyisocyanurate (PIR)
- Polyurethane (PUR)
- Mineral wool
- Rock wool
- Cellular glass (CG)
- Perlite Loose Fill Insulation
- Vermiculite Loose Fill Insulation
- *SASO is also in the process of developing standards for some secondary insulation products*

List of approved SASO insulation standards

SASO Standards	Insulation Materials
SASO ASTM C-578:2014	<ul style="list-style-type: none">• Rigid, Cellular Polystyrene
SASO-GSO-ISO-8873-1/2:2009	<ul style="list-style-type: none">• Spray-applied polyurethane foam
SASO-GSO-BS-4841-1/2/3/4/5/6:2010	<ul style="list-style-type: none">• Rigid polyisocyanurate (PIR)• Polyurethane (PUR)
SASO-GSO-EN-13162:2012	<ul style="list-style-type: none">• Mineral wool
SASO- EN-13167:2012	<ul style="list-style-type: none">• Cellular glass (CG)
SASO-ASTM C-549 :2007	<ul style="list-style-type: none">• Perlite Loose Fill Insulation
SASO-ASTM C-516 :2007	<ul style="list-style-type: none">• Vermiculite Loose Fill Insulation

MoMRA and SEC developed a joint implementation mechanism to ensure the enforcement of thermal insulation on new buildings

- Requirements have been revised for new building permits:
 - A **"No Objection Certificate"** from SEC
 - **Insulation compliance form** jointly signed by the design office and building owner
- **MoMRA** issued a **penalty mechanism** to punish the Design offices who are not complying with the enforcement of thermal insulation.
- **Three visits from SEC to construction sites** to monitor insulation installment
- **Violations are reported** by SEC and administered by MoMRA
- MoMRA issues building completion certificate only after **clearance from SEC**
 - Connection to power grid is subject to insulation installation



**Thank
you**