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:

**Chairman**

(President of KACST)

### Ministries
- Petroleum & Minerals
- Water and Electricity
- Municipality and Rural Affairs
- Commerce and Industry
- Transportation
- Culture and Information
- Housing
- Finance

### Other government entities
- King Abdulaziz City for Science and Technology
- Presidency of Meteorology and Environment
- King Abdullah City for Atomic and Renewable Energy
- Saudi Standards, Metrology and Quality Organization
- Electricity & Co-Generation Regularity Authority
- Saline Water Conversion Corporation
- Designated National Authority
- Saudi Customs
- Royal Commission for Jubail and Yanbu

### Companies and Private Sector
- Saudi Aramco
- Saudi Electricity Company
- SABIC
- Two representatives from the private sector
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.

### Executive-Committee

- Deputy Minister, Ministry of Commerce & Industry
- Deputy Minister, Ministry of Water & Electricity
- Deputy Minister, Ministry of Housing
- Deputy Minister, Ministry of Transportation
- Vice Governor, ECRA
- Secretary General of Public Investment Fund, Ministry of Finance
- Adviser to Minister, Ministry of Municipality & Rural Affairs
- Chief Engineer, Saudi Aramco
- Assistant Deputy Minster, Ministry of Commerce & Industry
- Director General of Quality Assurance, Saudi Standard Organization
- Director General, Saudi Energy Efficiency Center
- Director, Designated National Authority
- Executive Vice-President, SABIC
- Executive Vice President of Distribution and Customer Service, Saudi Electricity Company

### Technical teams

#### Buildings
- Members from SASO, SEEC, SEC, S. Aramco, ECRA, MoMRA, MoH, SABIC, KACARE, Customs, MoWE

#### Transportation
- Members from SASO, SEEC, MoT, Traffic Police, Customs, S. Aramco

#### Industry
- Members: SABIC, Saudi Aramco, SEC, MoCI, ECRA, SEEC

#### Awareness
- Members from Ministry of Culture & Information, MoWE, MoCI, Saudi Aramco, SEC

#### Urban Planning
- Members from Modon, ARDA, SRO, MoWE, MoT, S. Aramco

#### Funding
- Members from Aramco, SEEC, ECRA, DNA, MinPet, World Bank, MoF

#### ESCOs
- Members from Aramco, SEEC, World Bank, GIZ

### Review & Coordination Team

- Executive Vice President of Distribution and Customer Service, Saudi Electricity Company
- Adviser to Minister, Ministry of Municipality & Rural Affairs
- Chief Engineer, Saudi Aramco
- Secretary General of Public Investment Fund, Ministry of Finance
- Vice Governor, ECRA

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**TIC**
- Members from SEEC, Customs, MoCI, SASO

**HCR**
- Members from SEEC, TVTC, Universities, S. Aramco, SEC, SABIC

**EE Law**
- Members from MinPet, Saudi Aramco, Int’l law firm
SEEP has been an inter-government effort involving all stakeholders

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<tbody>
<tr>
<td>Ministry of Finance</td>
<td>Ministry of Transportation</td>
<td>Ministry of Communication &amp; Information</td>
<td>Electricity &amp; Co-generation Regulatory Authority</td>
<td>Saudi Standards, Metrology and Quality Organization</td>
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<td>Saudi Customs</td>
<td>ArRiyadh Development Authority</td>
<td>Saudi Energy Efficiency Center</td>
<td>Designated National Authority</td>
<td>Saudi Industrial Development Fund</td>
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<td>Saudi Building Code Nat’l Committee</td>
<td>Traffic Police</td>
<td>Saudi Industrial Property Authority</td>
<td>Royal Commission of Jubail &amp; Yanbu</td>
<td>Saudi Council of Engineers</td>
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<td>Saudi Code Nat’l Committee</td>
<td>Royal Commission for Jubail and Yanbu (RCJY)</td>
<td>Saline Water Conversion Corporation</td>
<td>Saudi Electricity Company</td>
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التنمية والأشغال البلدية والريفية

Jarir Customs

ArRiyadh Development Authority

King Abdulaziz City for Science and Technology

Designated National Authority

Saudi Building Code

Traffic Police

Saudi Industrial Property Authority

Royal Commission of Jubail & Yanbu

Saline Water Conversion Corporation

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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

- **EE Savings**
  - Sectors
    - Buildings
    - Transport
    - Industry
  - Initiative types
    - New buildings
    - Existing buildings
    - New fleet
    - Existing fleet
    - New plants
    - Existing plants
  - Enablers
    - Regulations (specific to initiatives)
    - ESCOs (Energy Service Companies)
    - Funding
    - Governance & ownership
    - Awareness
SEEP continues to partner with foreign governments and international organizations.
Agenda

• Saudi Energy Efficiency Program

• **Buildings sector fact-base**

• Insulation enforcement in new buildings
## 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)

Other include farms, co-ops, and desalination plants

Source: ECRA; SEC
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
Agenda

• Saudi Energy Efficiency Program

• Buildings sector fact-base

• 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**

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

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

<table>
<thead>
<tr>
<th>Issue the Thermal Transmittance Values</th>
<th>Review the proposed Insulation Values</th>
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</table>
| • Scope: Residential building (3 floors & below) applicable to:  
  - New buildings, and  
  - Modified and Renovated buildings.  
• Redefined climate zones  
• Two stage of enforcement | • 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

<table>
<thead>
<tr>
<th>Building element</th>
<th>Stage 1: ~ November 2014</th>
<th>Stage 2: January 2017</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Zone 1</td>
<td>Zone 2</td>
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<tr>
<td>Roofs</td>
<td>0.31</td>
<td>0.37</td>
</tr>
<tr>
<td>Walls</td>
<td>0.53</td>
<td>0.61</td>
</tr>
<tr>
<td>Vertical Glazing , 25% of wall</td>
<td>2.67 SHGC-0.25</td>
<td>2.67 SHGC-0.25</td>
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</table>
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

<table>
<thead>
<tr>
<th>SASO Standards</th>
<th>Insulation Materials</th>
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<tbody>
<tr>
<td>SASO ASTM C-578:2014</td>
<td>• Rigid, Cellular Polystyrene</td>
</tr>
<tr>
<td>SASO-GSO-ISO-8873-1/2:2009</td>
<td>• Spray-applied polyurethane foam</td>
</tr>
</tbody>
</table>
| SASO-GSO-BS-4841-1/2/3/4/5/6:2010 | • Rigid polyisocyanurate (PIR)  
                              | • Polyurethane (PUR)                                      |
| SASO-GSO-EN-13162:2012         | • Mineral wool                                             |
| SASO- EN-13167:2012            | • Cellular glass (CG)                                      |
| SASO-ASTM C-549 :2007          | • Perlite Loose Fill Insulation                            |
| SASO-ASTM C-516 :2007          | • 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