The Saudi Energy Efficiency Program

COP 24, December 2018
The Saudi Energy Efficiency Program has been on a journey since 2012

- Established through a Council of Ministers resolution
- Inter-agency effort to launch the Saudi Energy Efficiency Program (SEEP), with guiding principles, a clear strategy and strong governance

Full-fledged program with 13 teams

- ~80 initiatives at different stages (feasibility, design, execution)

New mandate for SEEC has been approved in 2018

Scope of work expands to cover:
- Power generation including Electricity transmission and distribution
- Water desalination
- Feedstock use in industry
SEEP mobilized **150+ professionals** from 30+ governmental entities and state owned enterprises

**SEEP Executive Committee**

- Ministry of Energy, Industry and Minerals
- Ministry of Environment, Water and Agriculture
- Ministry of Municipalities & Rural Affairs
- Ministry of Finance
- Ministry of Commerce & Investment
- Saudi Customs
- Saudi Aramco
- Electricity Generation and Co-Generation Regulatory Authority
- Saudi Standards, Metrology and Quality Organization
- Saudi Energy Efficiency Center
- Saudi Electric Company
- Saudi Arabian Basic Industries Corp. (SABIC)

**Technical teams**
- Buildings
- Industry
- Transportation
- Urban Planning
- Human Capital Development
- TIC
- Utilities
- Awareness
- ESCO

**Review & Coordination Team**
- Legal
- Funding

**Ad-hoc execution team**
- Ad-hoc execution team
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SEEP has so far focused on **three sectors**, representing **90+% of the energy consumption** in the Kingdom.

### Industry
- ~44% of energy consumed in KSA
- ~2.1 million barrels of oil equivalent per day

### Buildings
- ~29% of energy consumed in KSA
- ~1.4 million barrels of oil equivalent per day

### Transportation
- ~21% of energy consumed in KSA
- ~1 million barrels of oil equivalent per day

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**SEEC new mandate (2018) expands the SEEP scope**

- **Addition of Utility sector**: energy efficiency in Power Generation, Electricity Transmission and Distribution, and Water Desalination
- **Expansion of Industrial sector scope**: addition of efficiency of Feedstock Utilization in Industry
Industry: SEEC has developed an energy efficiency framework for industrial plants and has been implementing it over three phases

**INDUSTRY**

### EE FRAMEWORK TIMELINE

#### 3 Phases

**Phase I: 70% of total energy consumption**
Currently at the end of first cycle of implementation (started 2015)

**Phase II (Aluminum): 5% of total energy consumption**
Currently finalizing EE framework and targets

**Phase III: 13% of total energy consumption**
Started developing EE framework

#### Enabler

Agreement with Saudi Industrial Development Fund to provide soft loans for EE related projects in industry

#### Breakdown of targeted industrial sectors by consumption

<table>
<thead>
<tr>
<th>Industry</th>
<th>2016 consumption (MBDOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>666</td>
</tr>
<tr>
<td>Cement</td>
<td>21%</td>
</tr>
<tr>
<td>Petchem</td>
<td>38%</td>
</tr>
<tr>
<td>Remaining sectors (~30% of the total)</td>
<td>0%</td>
</tr>
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</table>

**Phase I implementation outcomes**

- **Steel**
  - 1.7% reduction in Energy Intensity for Direct Reduction plants

- **Cement**
  - 2.0% reduction in Energy Intensity for Cement plants, 0.6% reduction for Clinker Plants

- **Petchem**
  - 2.8% reduction in Energy Intensity for Petchem plants
**Buildings**: we developed **24 EE standards and regulations** (including 7 with mandatory labels)

**EE standards and regulations**

- 14 insulation standards
- Small AC EE standard
- Large AC EE standard
- Refrigerators and Freezers EE standard
- Washing machines EE standard
- Water heaters EE standard
- Clothes dryers EE standard
- 2 lighting products EE standards
- 2 Saudi Building Code regulations governing high-rise and low-rise buildings

**Increasing EE Rating (EER) requirements for split ACs**

- 2012: 7.5
- 2013: 9.5
- 2015: 11.5
- 2018: 11.8

+57% Minimum energy perf. standard (MEPS)
**Funding**: we assessed several incentives initiatives and selected some for implementation; the first is for **Highly Efficient ACs** and will launch on Oct 29, 2018.

### Context

- **Cooling** accounts for > 50% of electricity consumption in buildings and ~70% at peak cooling demand
- However currently there is **low penetration of Highly Efficient (HE) ACs** (i.e. far exceeding MEPS\(^1\))

### Objective of HE ACs initiative

- Stimulate the **sales and local production** of HE ACs

### Incentivized products

- KSA government provides a financial incentive in the form of a **price discount** for the end-user to buy a new HE AC instead of buying a regular AC

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Note: \(^1\) MEPS: Minimum Energy Performance Standard
Transportation: the Saudi CAFE standard for light duty vehicles was introduced in 2016, and led to significant improvements in the new fleet’s fuel economy.

We are currently developing the targets for the next phase implementation of the Saudi CAFE standard for light duty vehicles.

Note: CAFE: Corporate Average Fuel Economy; (1) Other factors include the dieselization initiatives and fuel price reform until 2021
Source: SEEC internal data
Transportation: the fuel economy label for light duty vehicles was introduced in 2014 and has been updated on an ongoing basis.

- **First FE label introduced**
- **Helps consumers visually understand the efficiency of vehicles**
- **Add an “Excellent +” category**
  - This came as a result of a dramatic increase in models registered under the “Excellent” bracket over time
- **Add support for Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs)**

Source: SASO 2487
**TIC**: the Testing, Inspection and Certification team manages efforts to **enforce the energy efficiency standards**

### ENABLERS

**EE Monitoring Authorities**

- Ministry of Commerce and Investment
- Saudi Customs
- Saudi Standards, Metrology and Quality Org.

### Products Monitored

- Air Conditioners
- Refrigerators
- Washing machines
- Lighting
- Thermal-insulating Materials
- Electric Motors
- Cars
- Tires

### Enforcement Results

- **37,000+** Factories, retail outlets and warehouse visits
- **5,000+** Infractions Issued
- **75+** Non-compliant factories closed
- **2.7M+** Products exported
- **2.1M+** Non-compliant products confiscated

**Note:** Figures represent achievements from 2013 to mid-2018
**HCD:** the Human Capital Development team **develops critical skills** in the Kingdom

### University courses
- **5** Universities offering EE courses; 8 more universities in the pipeline
- **270** Students enrolled

### Certification programs
- **3** Certificate programs offered in collaboration with the Association of Energy Engineers (CEM, CMVP & CEA)
- **22** Certification sessions conducted
- **180** Certified individuals

### Center of Excellence in Energy Efficiency at KFUPM
- **15** Students enrolled in CEEE
- **14** Undergraduates on exchange from KFUPM to USA

**Note:** CEM: Certified Energy Manager, CMVP: Certified Measurement and Verification Professional, CEA: Certified Energy Auditor, KFUPM: King Fahd University of Petroleum and Minerals

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**ENABLERS**

**HUMAN CAPITAL DEVELOPMENT**

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Note: CEM: Certified Energy Manager, CMVP: Certified Measurement and Verification Professional, CEA: Certified Energy Auditor, KFUPM: King Fahd University of Petroleum and Minerals

Saudi Aramco: Company General Use
**Awareness**: we continuously engage with the Saudi population through thematic awareness campaigns

<table>
<thead>
<tr>
<th>ENABLERS</th>
<th>AWARENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 awareness campaigns from 2014 to 2018</strong></td>
<td><strong>Variety of channels used</strong></td>
</tr>
<tr>
<td>[Image: Awareness campaigns]</td>
<td>[Image: Variety of channels]</td>
</tr>
<tr>
<td><strong>Traditional media</strong></td>
<td><strong>Online advertisement</strong></td>
</tr>
<tr>
<td>50 thousand ads in Radio, TV, Billboards &amp; newspapers</td>
<td>540 million impressions through websites and mobile applications</td>
</tr>
<tr>
<td><strong>Social media</strong></td>
<td></td>
</tr>
<tr>
<td>2.5 billion impressions</td>
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<tr>
<td>300 thousand followers</td>
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SEEP’s energy efficiency initiatives support economic diversification

- **Energy efficiency initiatives** (e.g. standards, regulations, product testing / control, incentives, ESCOs, district cooling)

  - **induced effects**

1. **More business opportunities**
   - in existing markets
   - Replacement / retrofits of capital stock of inefficient equipment, buildings and industrial plants
   - Increased demand in existing markets due to regulations

2. **Creation of new sectors/industries**
   - Opening and fast-tracking of new markets / industries (ESCOs, district cooling, testing labs) by establishing National Companies
   - Creation of high-quality local jobs

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**Economic diversification**
Increased demand and more business opportunities in existing markets

<table>
<thead>
<tr>
<th>Retrofits &amp; retirement</th>
<th>Regulations</th>
</tr>
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<tbody>
<tr>
<td>• Examples:</td>
<td>• Examples:</td>
</tr>
<tr>
<td>• 500+ M SAR per year of petchem / cement / steel plants retrofits for equipment manufacturer and engineering firms (to comply with aspirational Energy Intensity targets)</td>
<td>• ~100 M m² built annually with the obligation to install thermal insulation and highly efficient ACs in the government sector</td>
</tr>
<tr>
<td>• Cars replacement:</td>
<td>• New plants coming into the market will need to follow EI regulation</td>
</tr>
<tr>
<td>- ~12 M stock with ~2.5 M above 20 years of age</td>
<td></td>
</tr>
<tr>
<td>- ~850 K sales per year</td>
<td></td>
</tr>
<tr>
<td>• Light bulbs:</td>
<td></td>
</tr>
<tr>
<td>- ~90 – 120 M stock to be replaced after standard implementation</td>
<td></td>
</tr>
<tr>
<td>• White goods:</td>
<td></td>
</tr>
<tr>
<td>- ~0.4 M refrigerators and ~0.3 M washers sold per year</td>
<td></td>
</tr>
</tbody>
</table>
Establishment of new companies to open and fast-track new markets and industries

**Super-Energy Services Company**
- **Catalyst** for the ESCO industry
- New market for **buildings EE retrofits** with size of:
  - ~15-20 B SAR for governmental buildings
  - ~5-10 B SAR for large commercial buildings with significant upside if the electricity tariff increases

**National District Cooling Company**
- **Catalyst** for the deployment of District Cooling in master developments
- ~6-9 M tons of refrigeration with CAPEX of ~60 B SAR of district cooling to be installed over the next 15 years

**National testing labs**
- **Thousands of energy performance tests** for products sold on the Saudi market requiring labs
  - Air conditioners
  - White goods
  - Tires

- **Thousands of high-quality jobs** (e.g. engineering, project management) and localization of the supply chain
The Kingdom of Saudi Arabia is one of the world’s largest energy producers, yet it is committed to becoming a highly energy efficient country to safeguard its resources for future generations.
The sub-programs are developed in collaboration with all involved stakeholders.

- **Government entities**
  - For proper design and execution

- **Private sector**
  - To identify and resolve technical challenges

- **International entities**
  - To adapt success stories and avoid pitfalls

- **Technical experts**
  - To devise technical solutions to the challenges faced

- **End users**
  - For continuous feedback on initiative design

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**Governmental entities**
- Ministry of Housing
- Ministry of Commerce & Industry
- Ministry of Finance
- Saudi Customs
- Traffic Police
- Designated National Authority
- Electricity & Co-generation Regulatory Authority
- Ministry of Communication & Information
- Saudi Standards, Metrology and Quality Organization
- Ministry of Water & Electricity
- Ministry of Municipality & Rural Affairs
- Ministry of Petroleum & Mineral Resources
- Saudi Industrial Development Fund
- Ministry of Transportation
- Saudi Council of Engineers
- Saudi Building Code Nat'l Committee
- ArRiyadh Development Authority
- Saudi Energy Efficiency Center
- King Abdulaziz City for Science and Technology
- Saline Water Conversion Corporation
- Saudi Industrial Property Authority
- Royal Commission of Jubail & Yanbu

**Technical experts and organizations**
- Foreign governments and international organizations
  - GIZ
  - ABB
  - Siemens
  - General Electric
  - ICCT
  - Siemens
  - EPRI
  - Mitsubishi
  - Toshiba
  - Enel

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Saudi Aramco: Company General Use