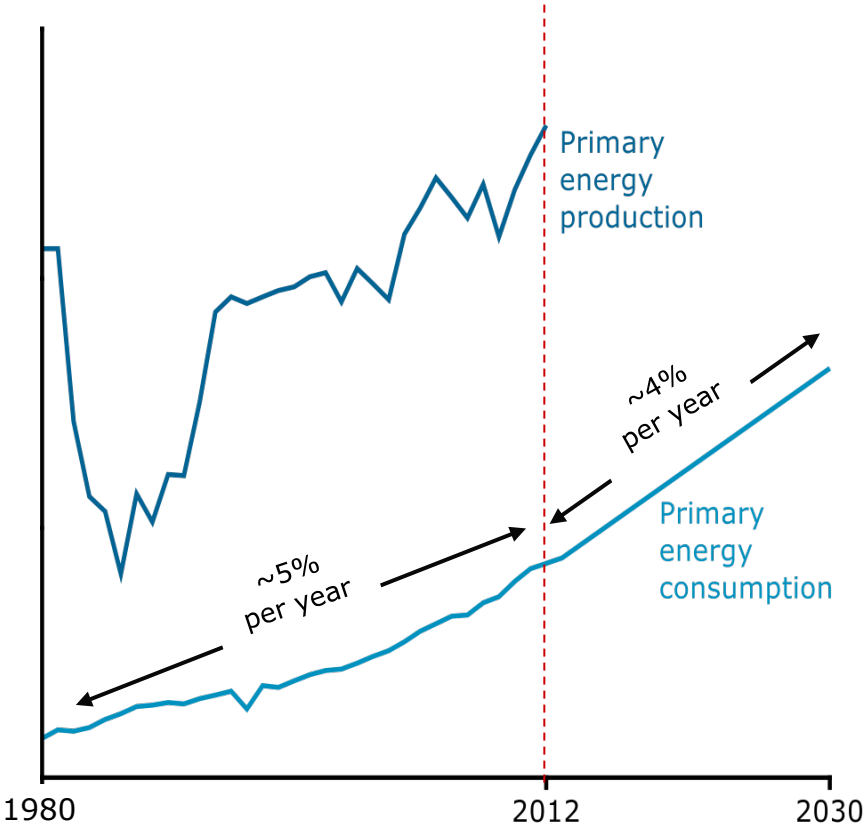


Saudi Energy Efficiency Program

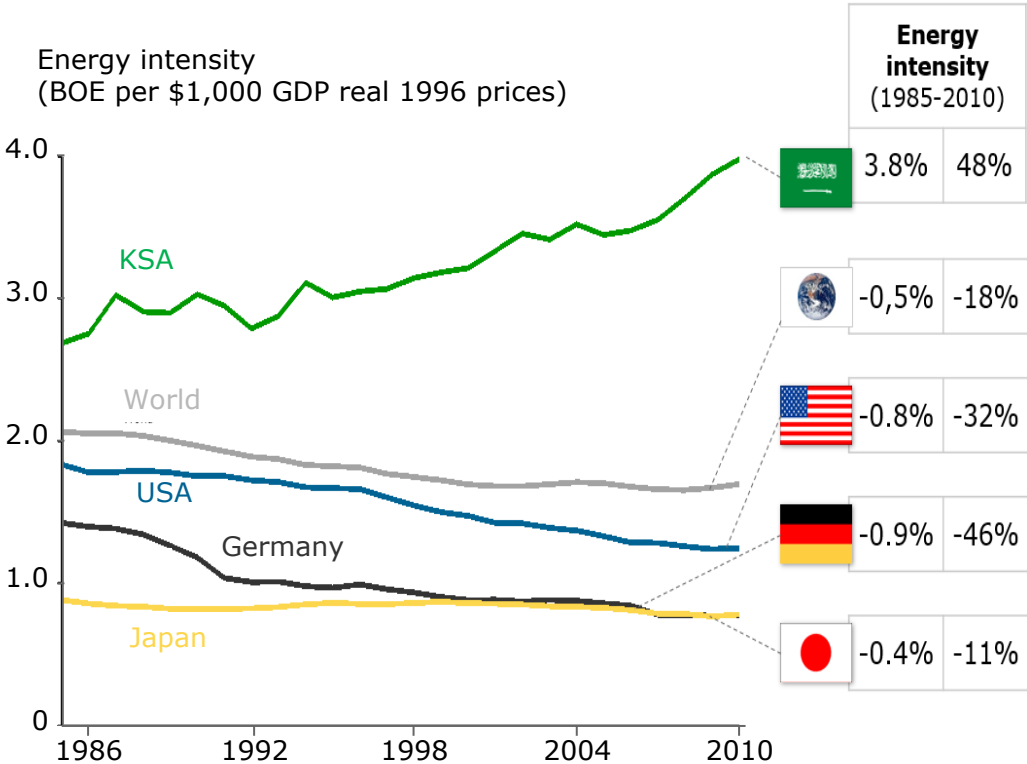
Overview

The Saudi Energy Efficiency Center (SEEC) was initiated based on a clear case for change

**KINGDOM HAS HAD A STEEP INCREASE
IN ENERGY CONSUMPTION**



**WITH ENERGY INTENSITY
LAGGING BEHIND BENCHMARKS**



The Saudi Energy Efficiency Center (SEEC)

OVERVIEW

- SEEC was established by the council of ministers to enhance **energy efficiency** and raise awareness on the topic
- SEEC is administered by a committee that includes **ministries and gov't entities** as well as **representatives from the private sector**

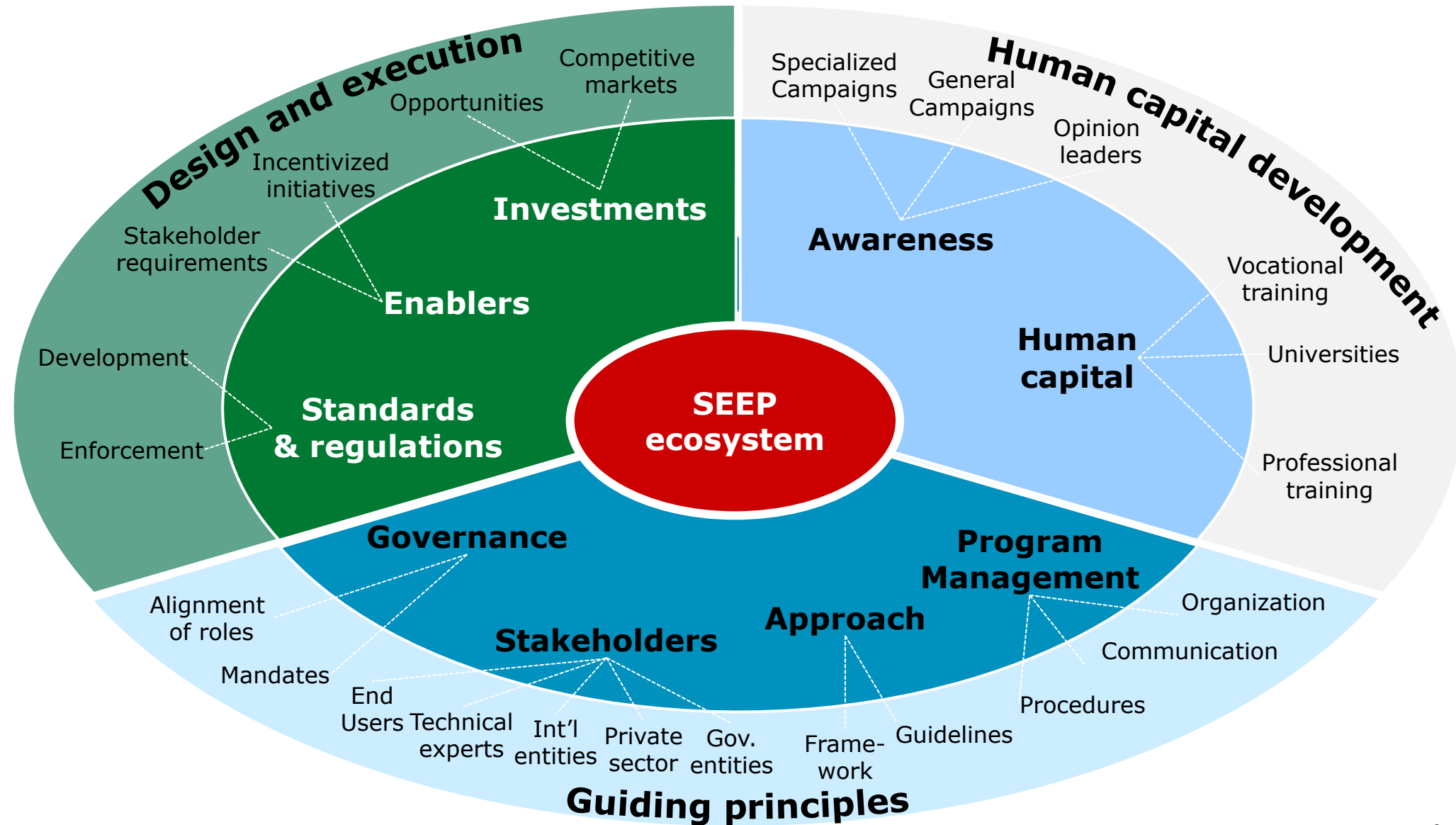


المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

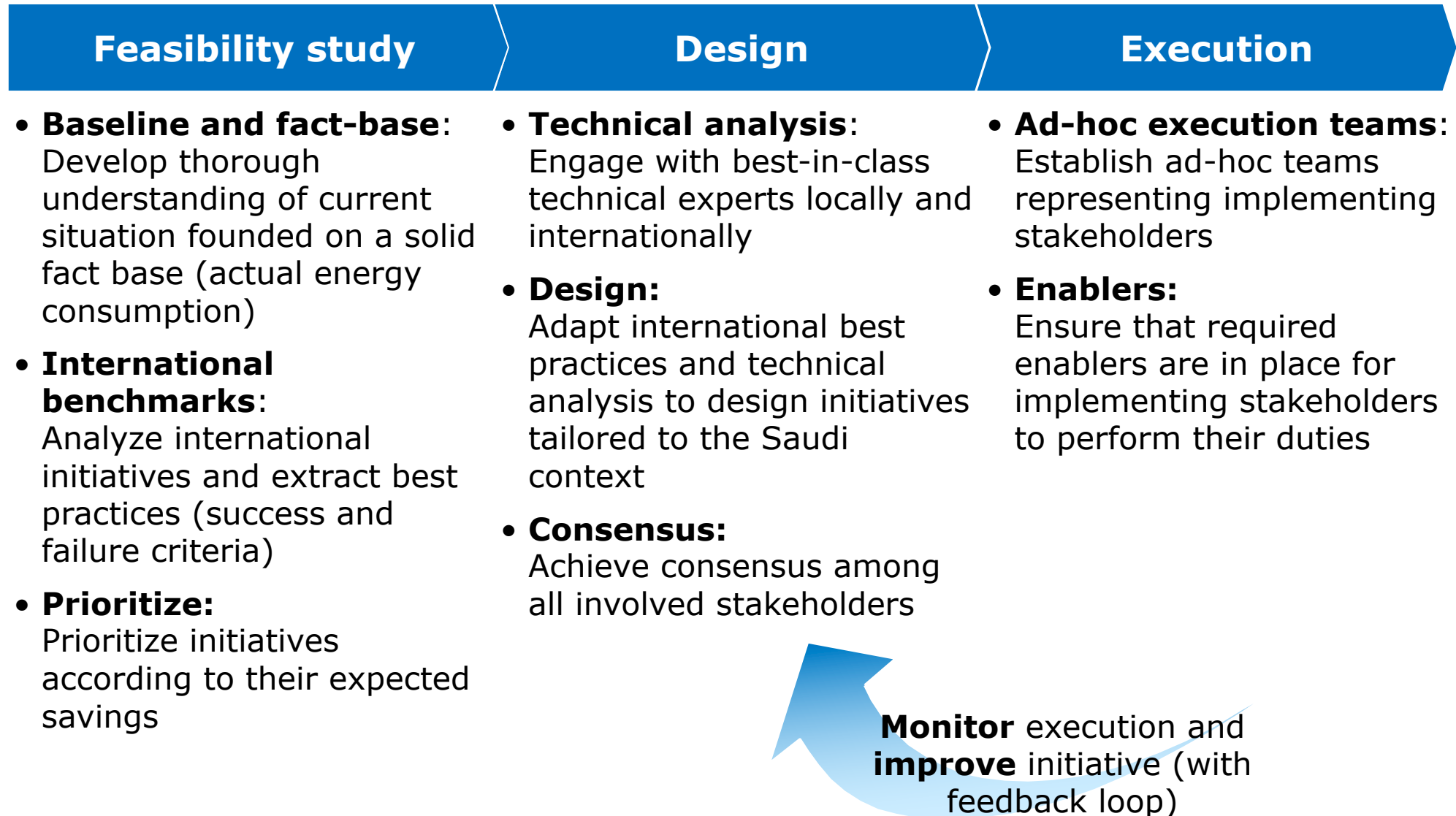
MANDATE

- Set up a **national program** to rationalize energy and enhance energy efficiency
- Develop **policies, regulations and rules** and support implementation
- Raise **awareness** on energy rationalization and energy efficiency
- Participate in the execution of **pioneering projects** in energy efficiency

SEEP ecosystem



SEEP **approach** follows a detailed framework



SEEP has been an inter-governmental effort involving all stakeholders



وزارة الطاقة والصناعة والثروة المعدنية
المملكة العربية السعودية

**Ministry of
Energy,
Industry and
Minerals**



**Ministry of
Municipality &
Rural Affairs**



المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

**Saudi Energy
Efficiency
Center**



**Designated
National Authority**



**Ministry of
Economy
& Planning**



**Ministry
of Housing**



**The General Presidency
of Meteorology and
Environment**

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture
المملكة العربية السعودية Kingdom of Saudi Arabia



**Ministry of
Finance**



**Ministry of
Transportation**



**Communications
and Information
Technology**



**Electricity &
Co-generation
Regulatory Authority**



**General
Investment
Authority**



**Economic
Cities
Authority**



**Saudi
Customs**



**ArRiyadh
Development
Authority**



**Saudi Standards,
Metrology
and Quality
Organization**



**King Abdulaziz
City for Science
and Technology**



**Ministry of
Commerce
and Investment**



**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**



**Capital Market
Authority**

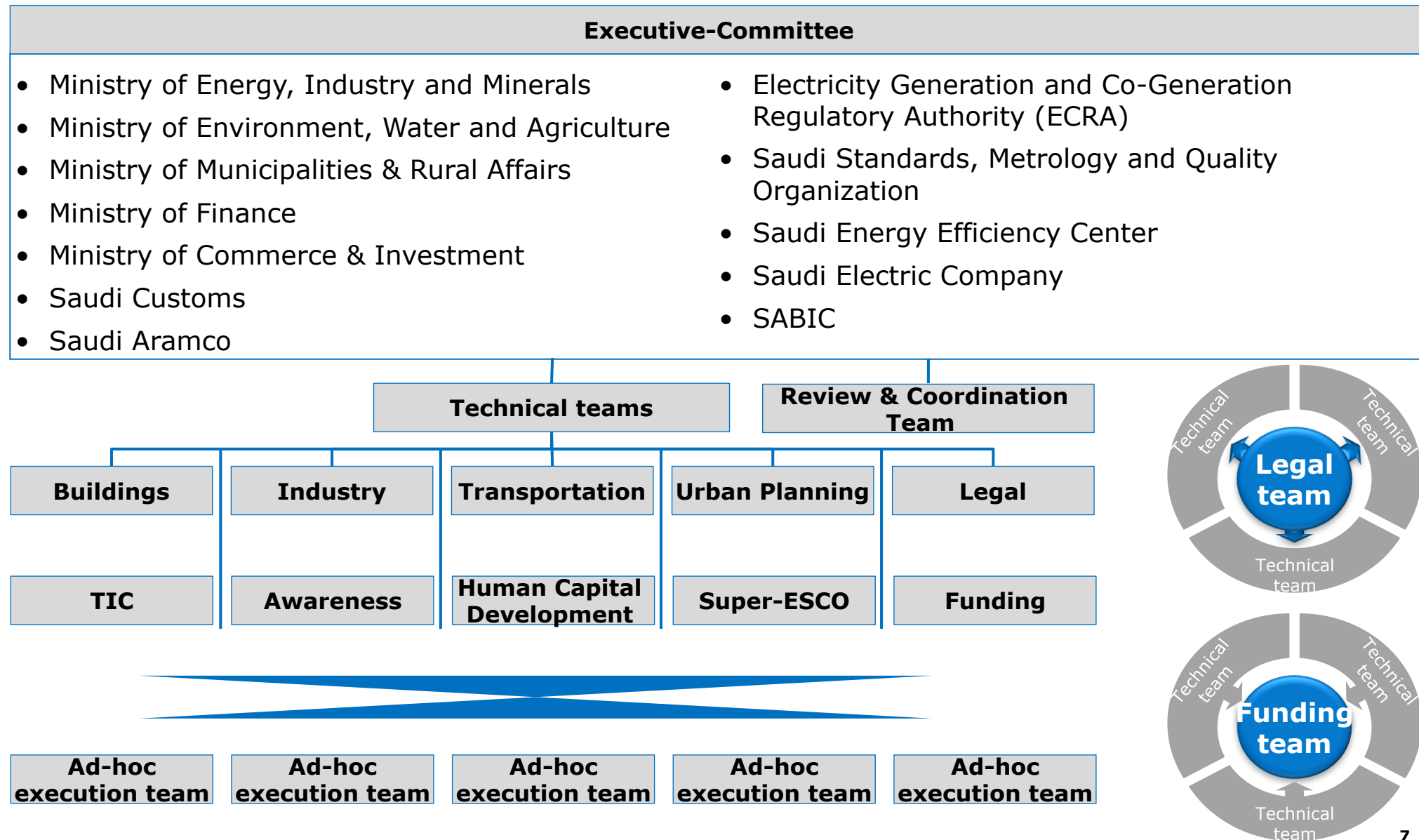


أرامكو السعودية
Saudi Aramco

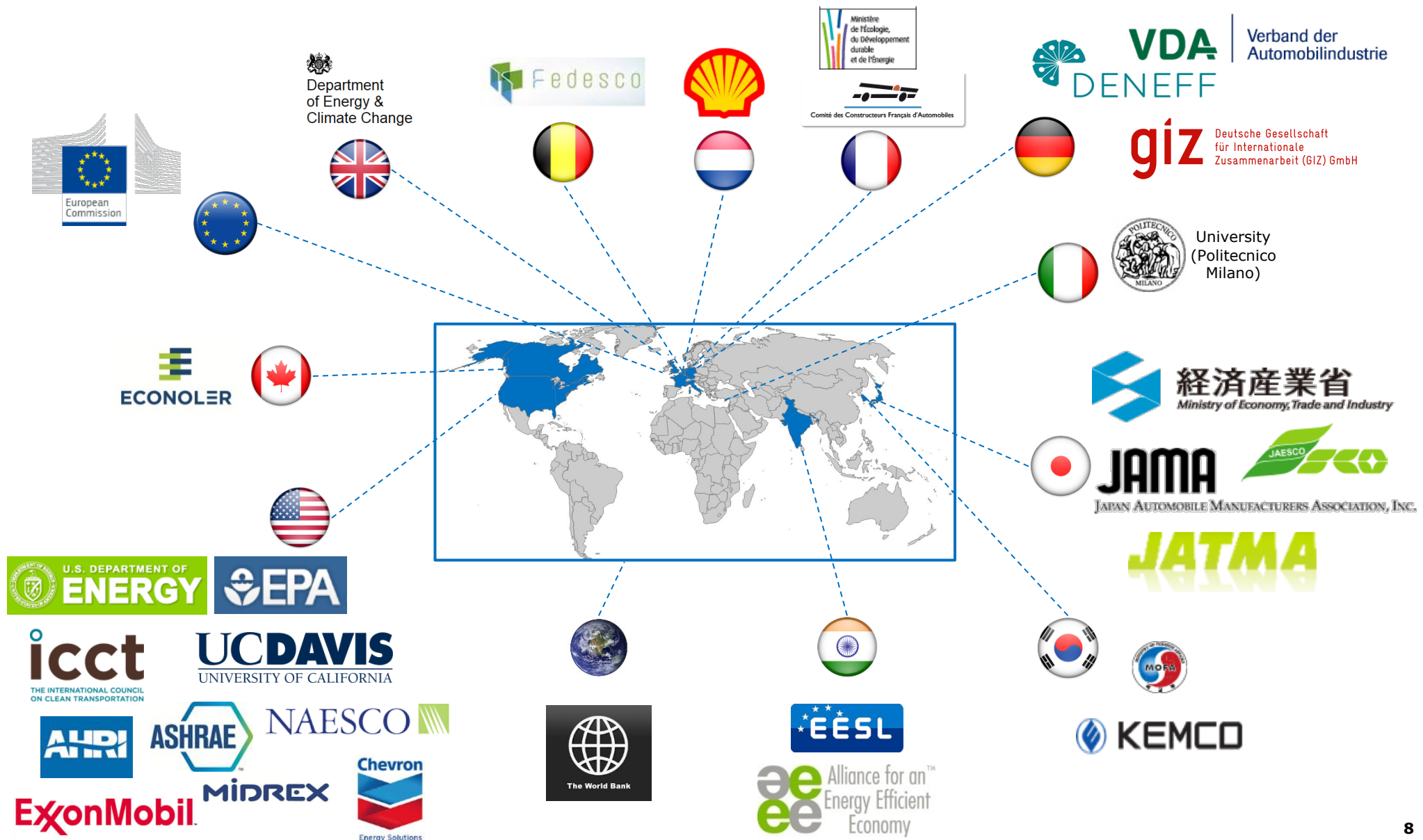
الشركة السعودية للكهرباء
Saudi Electricity Company

سابك
عندنا

SEEP mobilized 150+ professionals from 30+ governmental entities and state owned enterprises



SEEP continues to partner with foreign governments and international organizations



SEEP focuses on three sectors, representing 90+% of the energy consumption in the Kingdom

INDUSTRY



BUILDINGS



TRANSPORTATION



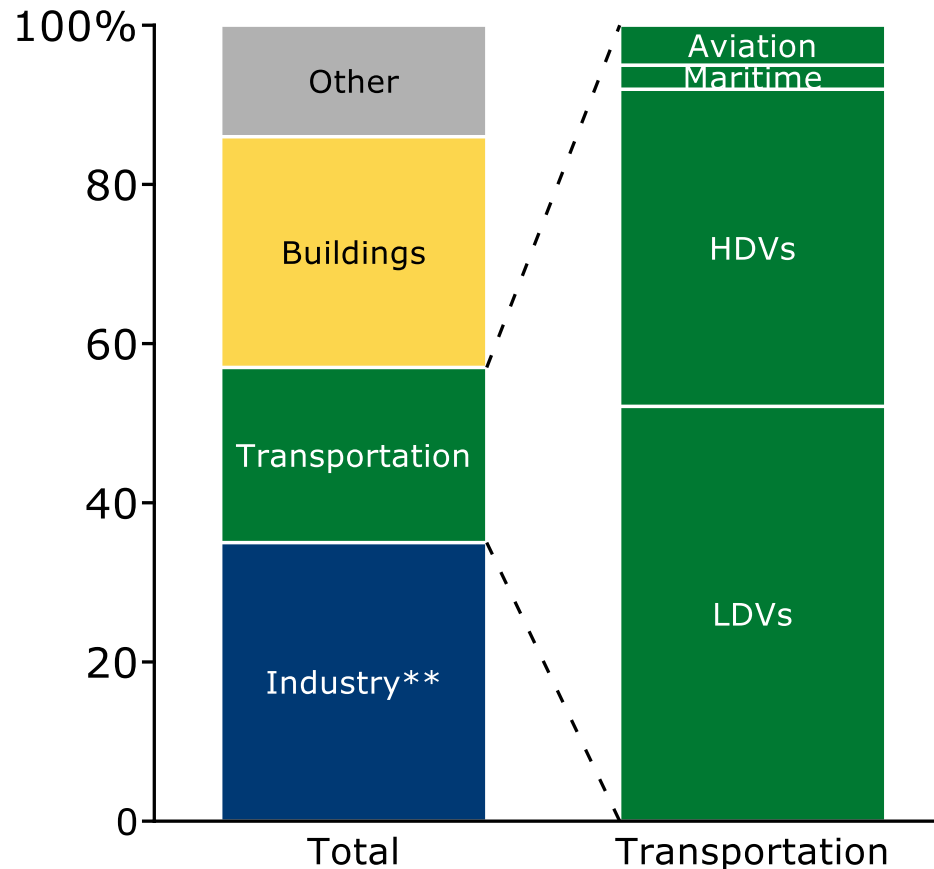
SEEP Guiding Principles

- 1 Focus on demand-side energy efficiency
- 2 Do not include price reforms
- 3 Design initiatives while ensuring no negative impact on end users
- 4 Achieve consensus with all involved stakeholders

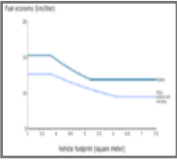
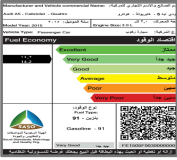
Transportation represented ~22% of the energy consumed driven by HDVs and LDVs consumption

TRANSPORTATION ENERGY CONSUMPTION IS FOCUSED ON LDVS & HDVS

Primary energy consumption
(2016 breakdown)

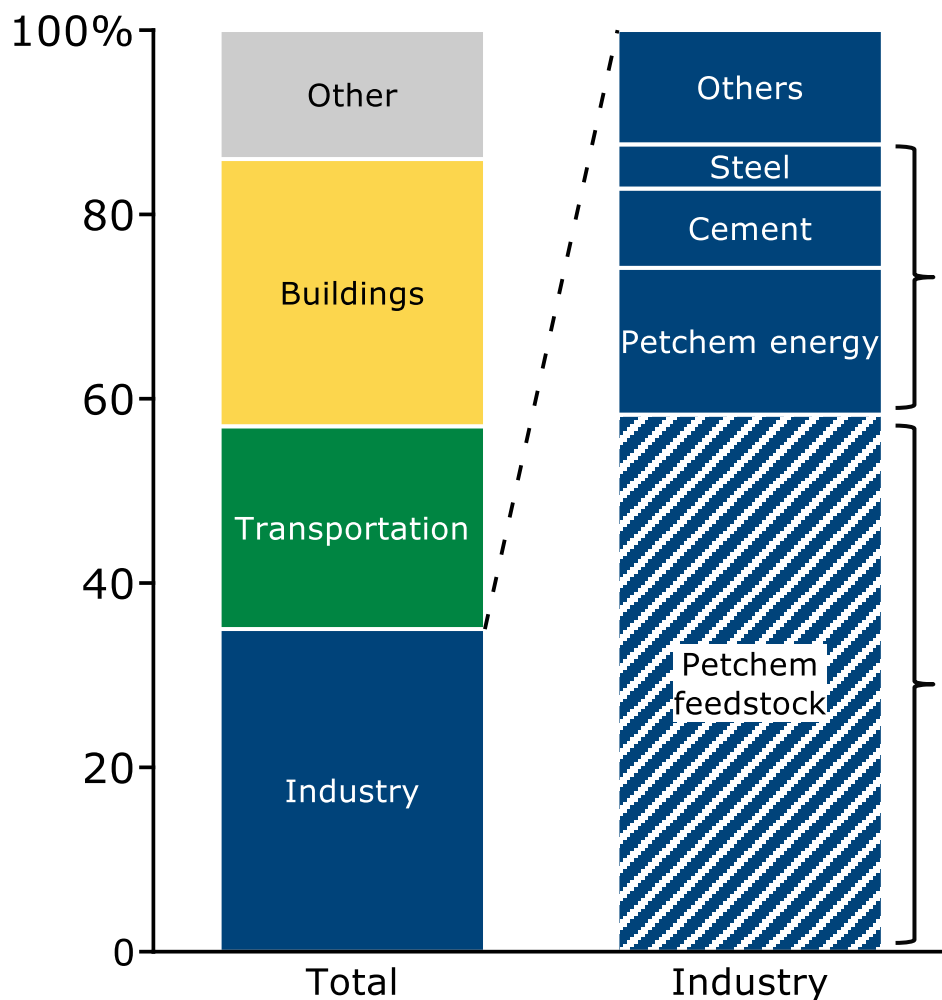


Transportation: We have designed and issued three energy efficiency standards and regulations for the transportation sector

		2012 - 2017	2018 - 2020
	Fuel economy standard for light duty vehicles	• Issued the fuel economy standard in November 2014 • Started implementing the standard in January 2016	• Developing and issuing phase 2 (2021-2025) of the fuel economy standard
	Tire Rolling resistance/ wet grip	• Issued a standard in April 2014 based on the work done by the EU • Started implementing the standard in November 2015	• Enforcing the phase 2 standard in November 2019
	Fuel economy label	• Issued a standard in December 2013 • Started implementing the standard in August 2014	• Enforcing the phase 2 label for 2019 MY vehicles
	HDV regulations	• Drafted a first version of the aerodynamic regulation and shared it with the manufacturers	• Implementing the aerodynamic regulation
	On the road program	• Benchmarked scrappage programs that take place around the world	• Finalizing the feasibility analysis of the program implementation

Industry represented $\sim 35\%$ of the energy consumed with $\sim 85\%$ in petrochemical, cement and steel industries

Primary energy consumption (2016 breakdown)



SEEP has focused its effort on the energy consumed by the 3 largest industrial sub-sectors

The feedstock is out of SEEP's scope

We developed an energy efficiency framework for new and existing plants, and worked with government entities to enforce targets

Baseline & benchmark

- Baselined and benchmarked 180+ Saudi plants from 59+ different production processes

Targets

- New plants to be designed at the average of the 1st quartile of global benchmark
- Existing plants to reach 2nd quartile of global benchmark

Enforcement

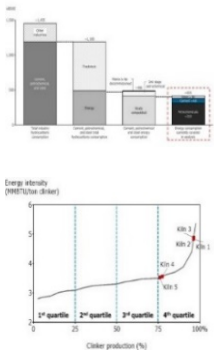
- Worked with 11 government entities to leverage their current mandates to help plants implement the requirements



Industry: We started enforcing the energy intensity targets for existing and new plants in the industry sector, as well as the electric motor standard

2012 - 2017

2018 - 2020



New and existing plants energy efficiency

- **Developed baseline for 180+ Saudi petchem, cement and steel plants** for ~59 different production processes
- **Established energy intensity (EI) targets based on international benchmarks** for the petchem, cement and steel processes:
 - **New plants: average 1st quartile** of the 2011 global benchmark curves
 - **Existing plants: average 2nd quartile** of the 2011 global benchmark curves
- **Developed enforcement mechanism** with 11 government entities to leverage their current mandates to help plants reach their aspirational improvement level and **signed a joint agreement in this regard**

- **Implementing the new and existing plants frameworks (i.e. EI targets)** on the petchem, cement and steel sub-sectors
- **Assessing the applicability of the existing and new plants frameworks (i.e. EI targets) on the aluminum sub-sector**
- **Developing new frameworks to cover new sub-sectors** (other than petchem, cement, steel and aluminum) in SEEP scope



Electric motors standard

- **Issued standard** in December 2013 (SASO IEC 60034-30)
- **Started implementing MEPS** (minimum energy performance standard) in August 2015

- **Updating the standard** to align with best international practices
 - The new standard will be issued in 2018



Energy management system

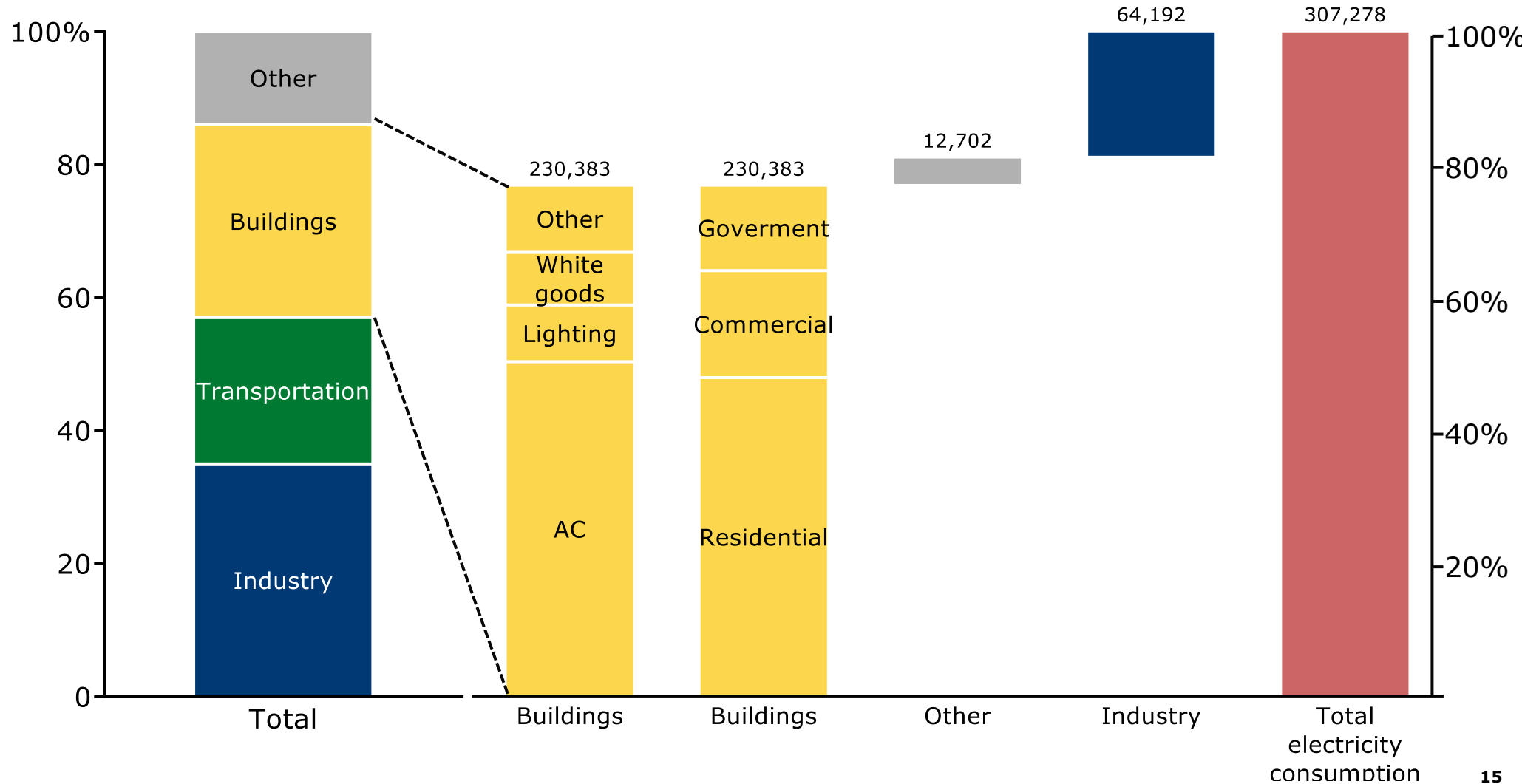
- **Developed factbase on Energy Management System (EnMS)**

- Developing **support structure to help industrial plants in implementing energy management system** such as **ISO 50001**

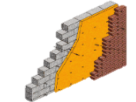
Buildings represented ~29% of the energy consumed with ~70% for cooling

**Primary energy consumption
(2016 breakdown)**

**Electricity consumption
(2016, GWh-year)**



Buildings: We have designed and issued 22 energy efficiency standards and regulations for the buildings sector

		2012 - 2017	2018 - 2020
	Air conditioners	- Issued the small AC standard in 2012 according to the ASHRAE values - Currently finalizing a new update for the standard - Issued the large AC standard in collaboration with AHRI.	Continuing standard enforcement
	Thermal insulation	- Issued 13 thermal insulation standards - Issued a thermal insulation regulation for new buildings in collaboration with ASHRAE	Continuing standard enforcement
	White goods	Issued the standards in 2013 (Refrigerators, Freezers, Washing Machines) Began enforcement and currently finalizing the washing machines and refrigerator standard updates as well as a new standard for clothes dryers	Continuing enforcement for current standards and beginning enforcement for new/updated standards
	Water heaters	Finalizing a new standard for water heaters	Beginning standard enforcement
	Lighting products	- Issued the first part of the lighting product standard in Q3 2015 - Currently submitting the second part of the lighting product standard to the World Trade Organization (WTO)	Continuing enforcement for Lighting part I and beginning enforcement for Lighting part II
	Saudi Building Code (SBC)	Updated, in collaboration with ASHRAE, the energy efficiency section of the SBC	Approving and enforcing the Building code update
	Energy Use Intensity (EUI)	- Conducted a feasibility study and built a factbase based on international practices - Obtained approval to begin the high-level design of the EUI initiative	Completing initiative design and beginning implementation by 2020

UP/DC: We started implementing EE Urban Planning guidelines into national regulations and are progressing on developing the DC market

Urban Planning and District Cooling

2012 - 2017

2018 - 2020



Urban planning guidelines for energy efficiency

- Developed EE **urban planning guidelines for new developments** and aligned with all relevant stakeholders
- Signed MOU with the related government entities to integrate the EE urban planning guidelines into existing regulations (MOMRA, MOH, MOT, ADA, ECA, RCJY, etc.)

- Working with MOMRA to develop comprehensive EE guidelines for urban planning



District cooling regulations

- Worked with relevant government entities in order to appoint ECRA as the district cooling regulator
- Developed a district cooling **regulatory and financial framework**
- Issued a decree from Council of Ministries **for mandating District Cooling in government projects** when meeting the set criteria

- Working with ADA to conduct a feasibility study for DC zones in Riyadh

We've continued the development of the ESCO sector through the launch of the S-ESCO and establishment of the required infrastructure

Initiative

2012-2014

2015 - today



ESCO market
feasibility

- Conducted a **feasibility study** to determine the **commercial attractiveness** of a government owned company that will **fund and manage** retrofit projects
 - Setup a national ESCO (Super-ESCO)
- Established the **National ESCO Company (S-ESCO)**
- Launched pilot ESCO projects:** Retrofit the Ministry of Energy, Industry and Minerals Resources building
 - Savings worth ~36% of annual consumptions, 4 year payback



ESCO market
enablers

- Identify **key barriers** to industry development including technical, financial, and legislative issues
- Defined the optimum **ESCO industry structure** for the Kingdom to overcome barriers and launched
- Established a **licensing scheme** for energy companies in the Kingdom
- Developed a national **measurement and verification user guide** as a **reference for savings calculation** in retrofit projects

To support these opportunities, we launched Human Capital Development program that targets university, vocational and professional students

Universities

Offering an **EE university course** in 5 engineering schools



King Abdulaziz University

Technical and vocation training

Preparing to offer a **EE technician degree** with a local institution (Vocational Training e.g. National Power Academy)

Professional training

in
Cooperation
with (AEE)



Offered first
Certified Energy Manager (CEM)
certification in
Saudi (Nov. 2015)



- ✓ **6 courses EM, 146 attendees, 106 CEM**
- ✓ **3 course EA, 53 Attendees, 40 CEA**
- ✓ **2 course M&V, 22 attendees, 9 CMVP**
- ✓ **14 Certified Trainers**

We have also targeted the public with general awareness and specialized campaigns to support the launch of the EE initiatives

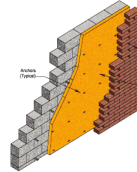
Since 2013...

Awareness campaigns

AC



Insulation



White goods



LDVs



Using multiple channels

Press



Mall/ Outdoor



Radio



Television



Social Media



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Thank you