IRAN Strategies for CCS

International Energy Forum - Global CCS Institute
Symposium on Carbon Capture and Storage
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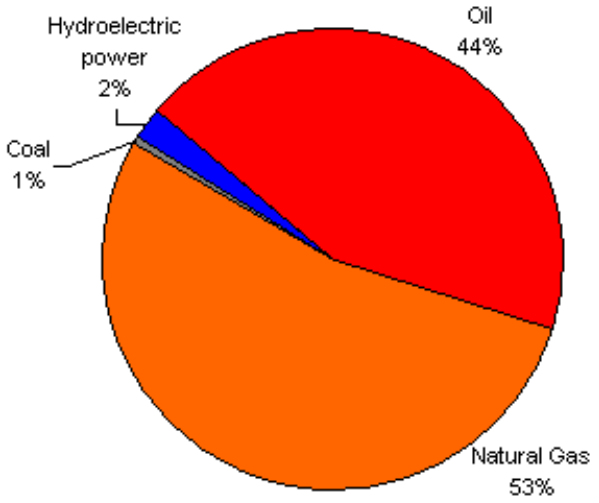
Session Two:

Existing projects: bridging the gap between pilot and commercial units?

Iran

Iran is OPEC's second-largest producer and exporter after Saudi Arabia, and in 2008 was the fourth-largest exporter of crude oil globally after Saudi Arabia, Russia, and the United Arab Emirates. Iran holds the world's third-largest proven oil reserves and the world's second-largest natural gas reserves.

Total Energy Consumption in Iran (2008)

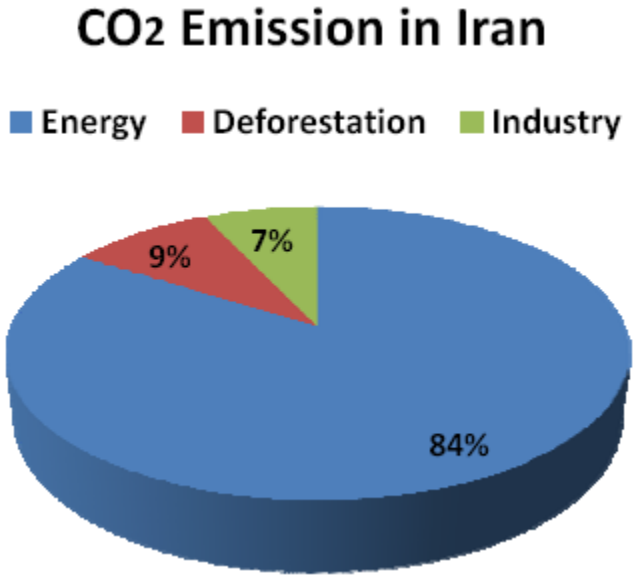


Source: EIA International Energy Annual 2007

CO_2 Emission in Iran (2008)

- Iran is the 10th CO_2 emitter country in the world
- The overall CO_2 emission in Iran is equal to :

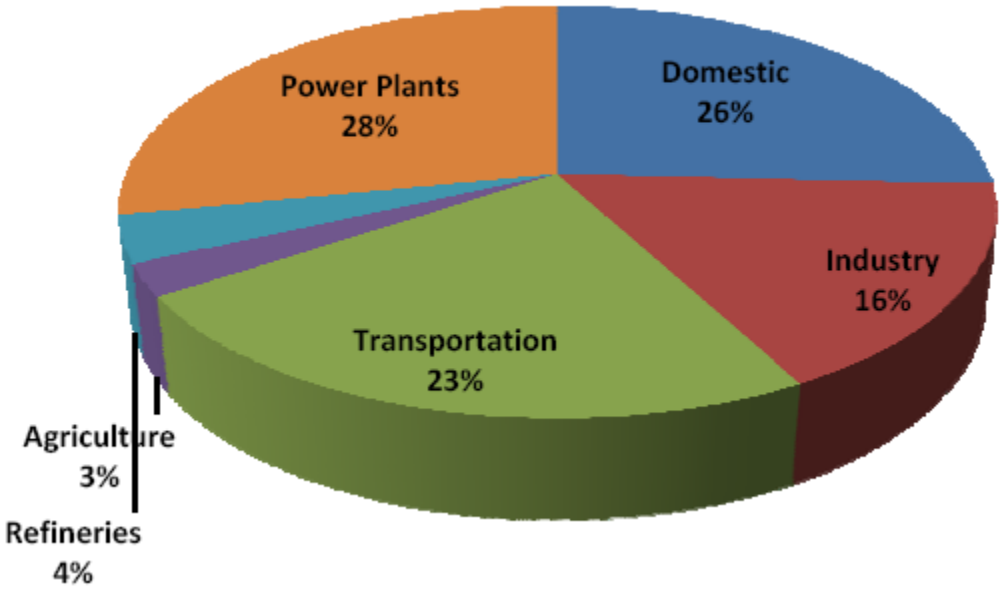
480 Mt per year



Change in greenhouse gas emission from 1992 to 2007

Country	2007 Per-Capita CO2 Emissions (Metric Tonnes per person)	Share of 2007 Worldwide CO2 Emissions
World Total	4.52	100.0%
China	4.75	21.01%
USA	19.94	20.08%
Russia	11.83	5.59%
India	1.25	4.68%
Japan	9.91	4.22%
Germany	10.13	2.79%
Canada	17.91	1.97%
UK	9.28	1.89%
South Korea	10.69	1.72%
Iran	7.5	1.64%
Italy	7.92	1.54%
Australia	21.99	1.53%
Mexico	4.17	1.51%
South Africa	9.35	1.51%
Saudi Arabia	15.73	1.45%

Share of Different Energy Sectors in CO_2 Emission in 2008



Major stationary CO2 source to capture

- **Power Plants**
- **Oil & Gas Industry**
- **Big Industries**

Power Plants

✓ Around 100 m tone CO_2 year are emitted from power plants in Iran.

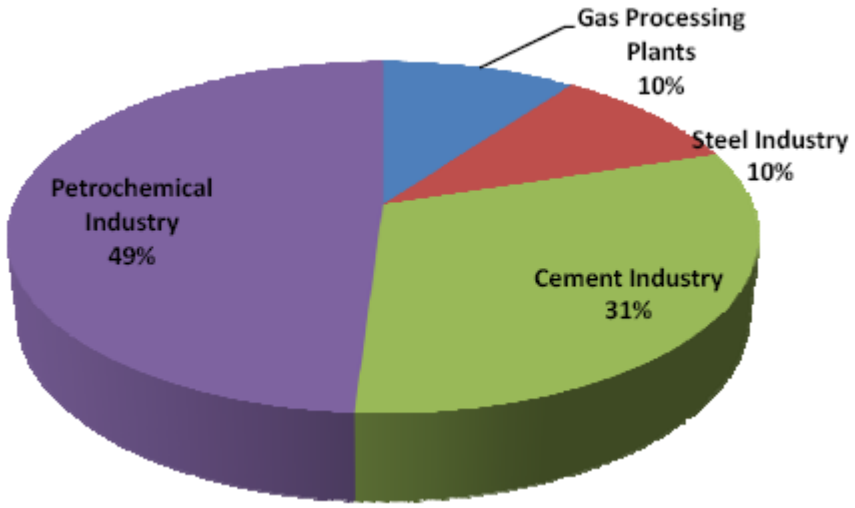
✓According to Screening criteria for CO_2 capture (for CO_2 EOR), 4 power plants are selected to capture CO_2 : RAMIN- KAZEROON-ZARGAN-FARS.

✓ The economical study is done for Ramin Power Plant (For 100 tone CO_2 per day) and the capture cost is around 20 $ per tone of CO_2 .

Rank	Gas power plant	Steam power plant	Combine Cycle power plant
1	Damavand	Shahid Montazeri	Gilan
2	Hormozgan	Shahid salami(Neka)	Kerman
3	Rey	Ramin-Ahwaz	Kazeroon
4	Sanandaj	Shazand-Arak	Neyshaboor
5	Parand	Bandarabbas	Shahid Rajaee
6	Abadan	Eslam Abad(Esfahan)	Montazere Ghaem

Industrial CO_2 Sources other than Power plants

- Oil & Gas Industry
  - Sweetening Gas Plants
  - Sour Gas venting
  - Refineries
- Cement Industry
- Steel Industry
- Petrochemical Industry
  - Ammonia
  - Hydrogen
  - Ethylene Oxide
  - Olefin



NIOC Mitigation Strategies to Control GHG Emission and existing projects progressing

- Reduce GHG Emission
  - Energy management
  - Clean and Renewable Energies
  - Flare Gas Recovery
- **Two main group were established in NIOC and two projects were been defined as below:**

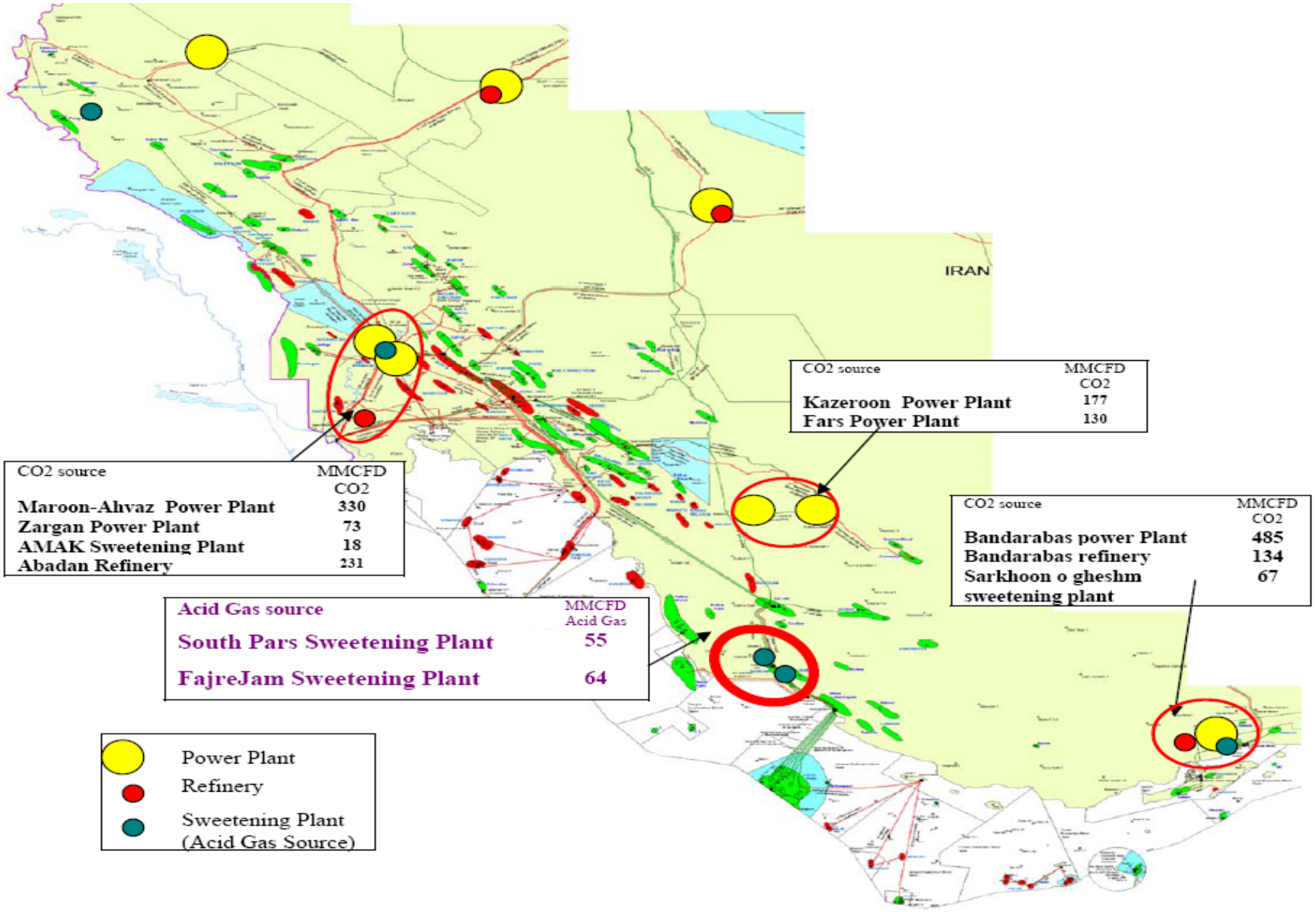
- Carbon capture and storage (CCS)
- CO2 Capturing and Injection for EOR Purpose

What are the opportunities for CCS in oil and gas producing countries like IRAN?

Existing of Depleting Oil and Gas Reservoir:

- Facilities and infrastructure are available
- Data in relation to well and reservoir is Existed

Iran Industrial CO_2 Sources



Gas Sweetening Plants:

An Innovative CO_2 Storage Opportunity

Low Hanging Fruits

Gas Plant	Acid Gas Composition		Acid Gas MMSCFD
	CO_2%	H_2S%	
South Pars Phase 1-5	70-65	30-35	55
Fajr e Jam	98	2	64
Hasheminejad	65	35	160
Amak	75	25	18
Ilam	75	25	35
Sarkhoon o gheshm	98	2	67

South Pars Field

Acid Gas Composition		Acid Gas (MMSCFD)	South Pars Phases
CO2%	H2S%		
64.55	34.27	6.24	1
71-65	29-35	32.6	3-2
60.73	34.66	13.18	5-4
-	-	Injection for EOR	8-7-6
89.61	0.093	0.17	10 - 9
53.68	36.39	1.53	
		53.72	Sum

project progressing:

Finding sinks for CCS in South Pars ,screening criteria on :

- Depleted oil and gas reservoirs
- Oil and gas reservoirs for EOR
  - There are some reservoirs in FARS and BOSHEHR Provinces
- Deep saline aquifers
  - Tabnak , Varavy , Shanol , Homa ,Asaloye ,Kangan ,Nar
- Salt domes
  - Kangan

Thank you