Moving Towards Renewable Energy Integration In Iran's Energy Market opportunities and challenges

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SALZBURG

21 REFORM Meeting 2017

Contens

- Country Profile
- Energy and economics
- Energy Policies
- Renewable Energy Regulation and Implementation
- Opportunities & Challenges

Country Profile

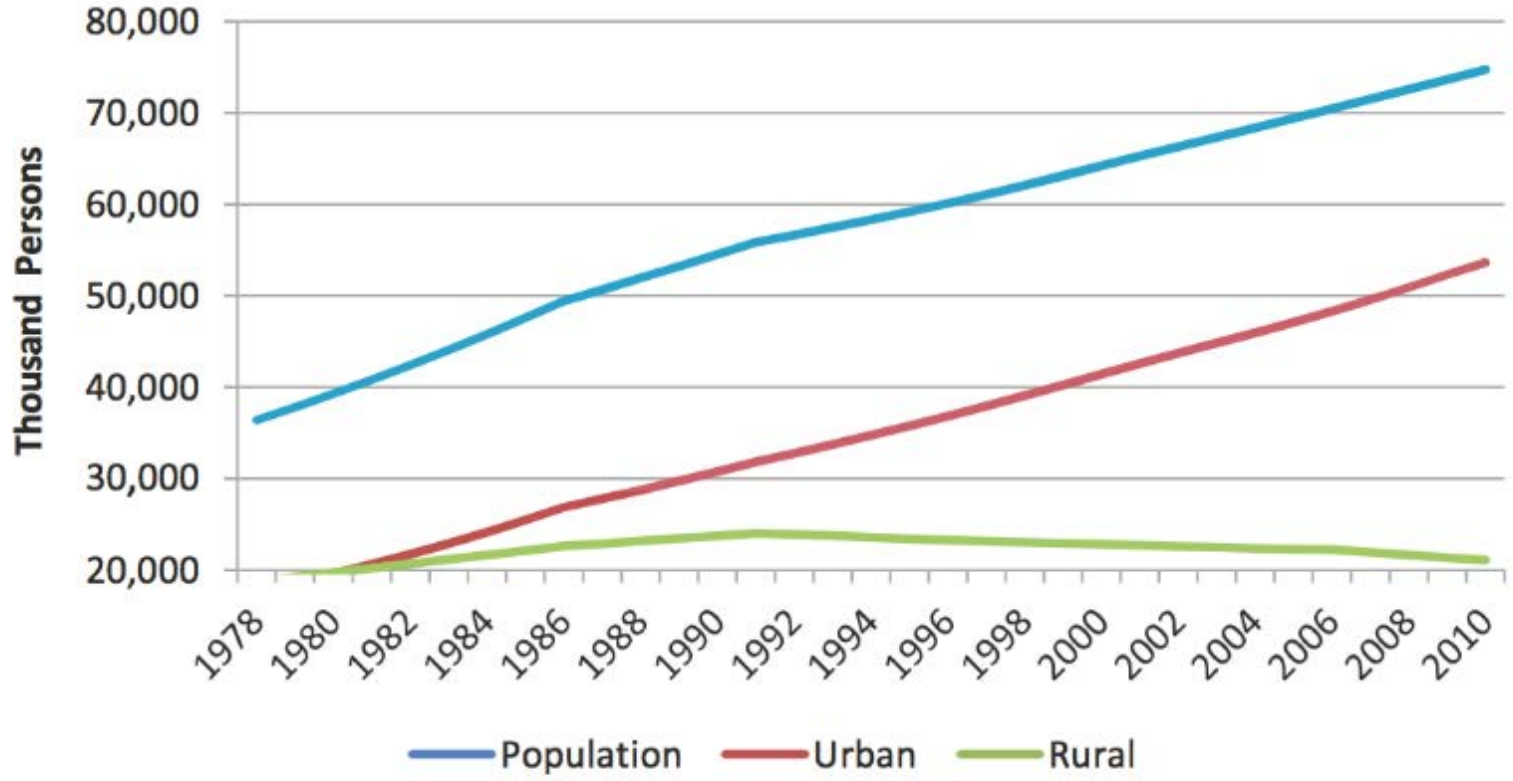
- The 18th largest country in the world in terms of area with 1,648,195 km^2, Iran has a population of around 80 million.

Country Profile

- It is a country of particular geopolitical significance owing to its location in the Middle East and central Eurasia.

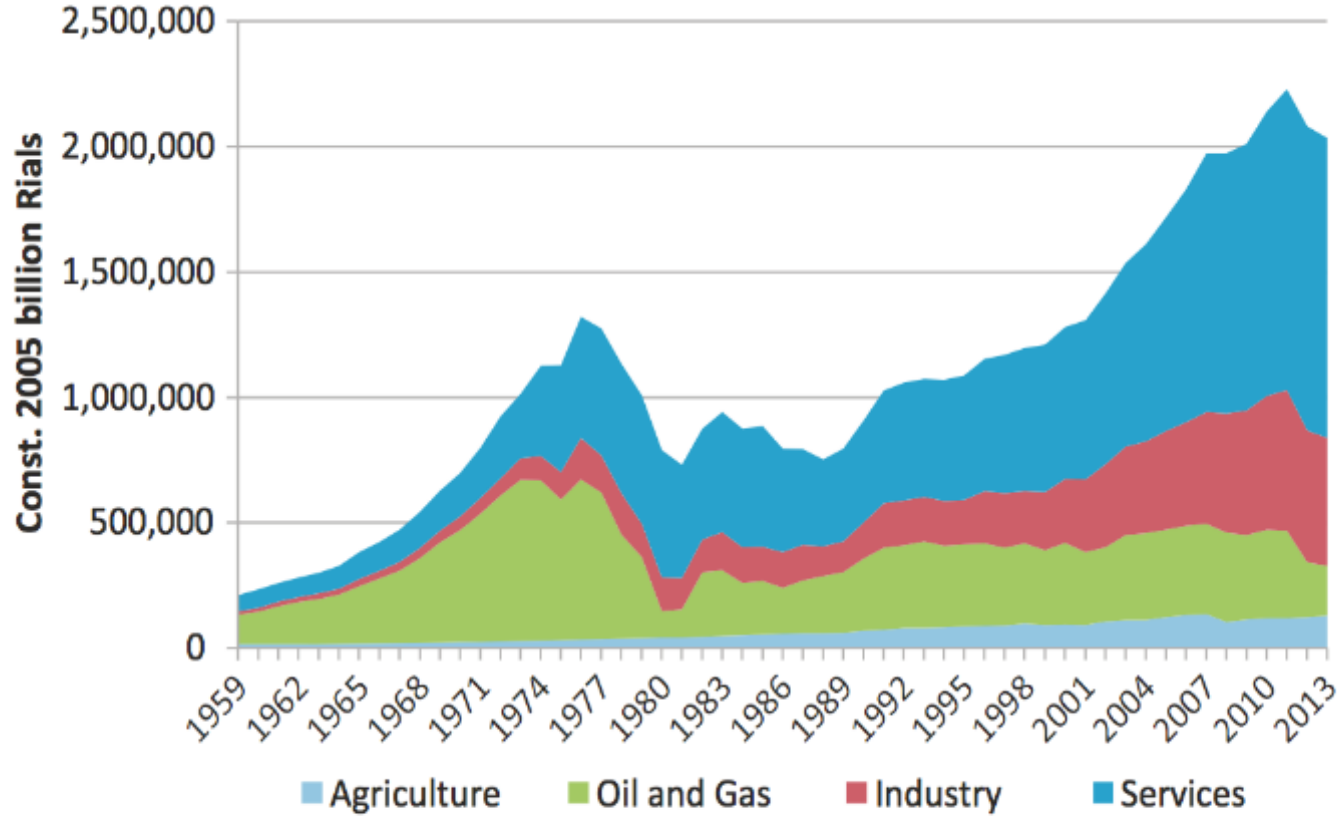

KAZ.
UZBEKISTAN
GEORGIA
ARMENIA
AZERB.
TURKEY
TURKMENISTAN
SYRIA
LEBANON
IRAQ
IRAN
AFGHAN-
ISTAN
ISRAEL
JORDAN
KUWAIT
PAK-
ISTAN
EGYPT
QATAR
SAUDI
ARABIA
U.A.E.
OMAN
SUDAN
ERITREA
YEMEN
www.freeworldmaps.net

Urban Population growth



Population Trends in Urban and Rural Areas

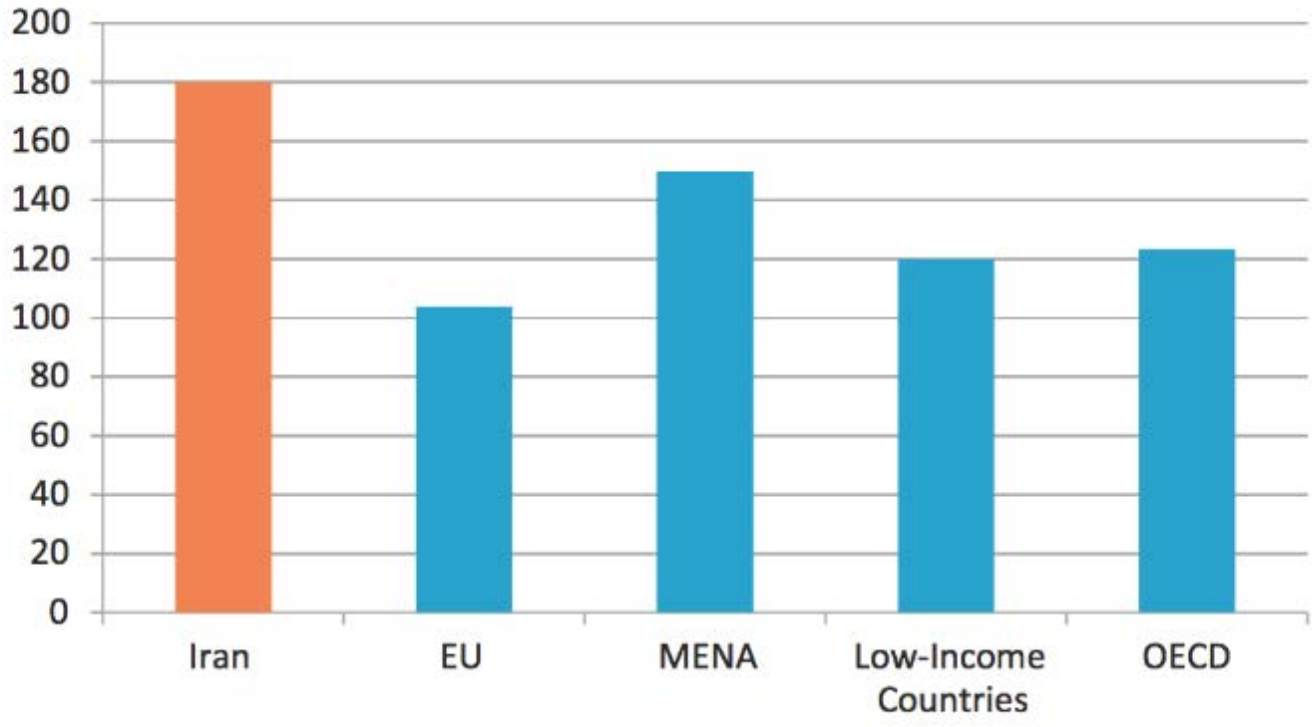
Source: Central Bank of Iran, Economic Data (2014)



GDP and its Components (constant 2005 billion rials)

Source: Central Bank of Iran, Economic Data (2014)

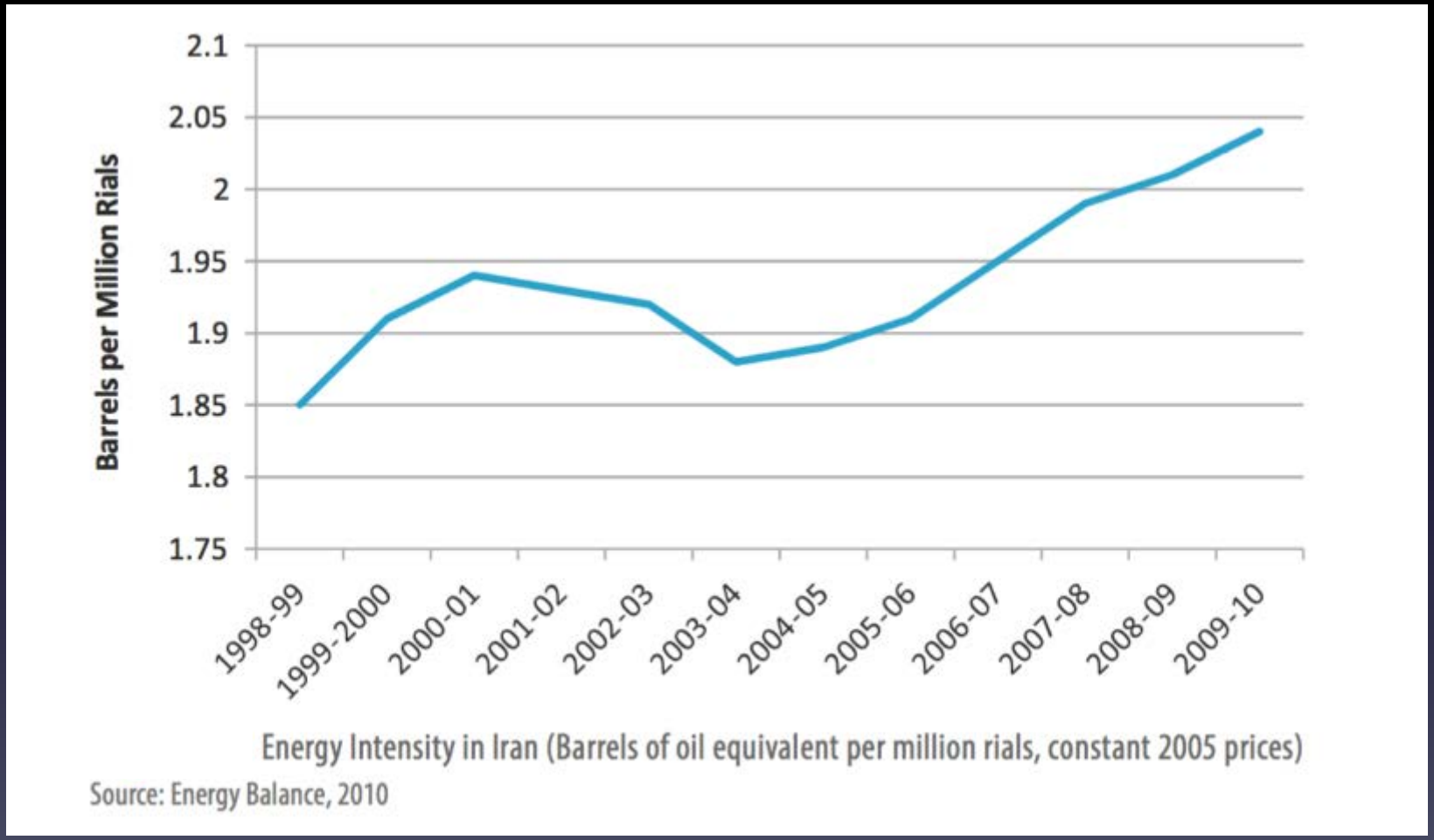
Energy Economics



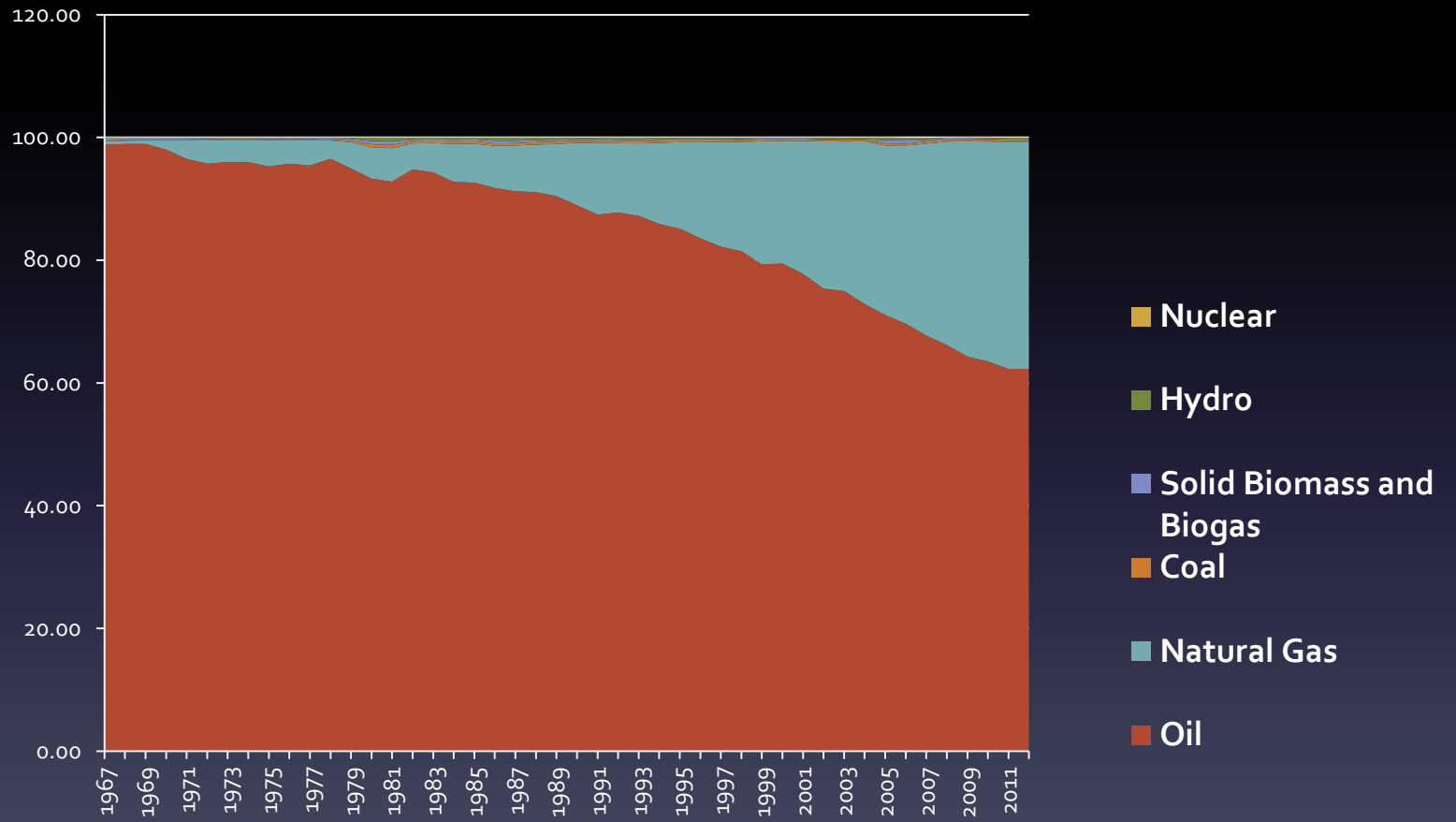
Energy Intensity in Iran and Selected Regions (2010)

(Kg oil equivalent per $1000 GDP, constant 2011 PPP)

Source: World Bank, World Development Indicators (2014)

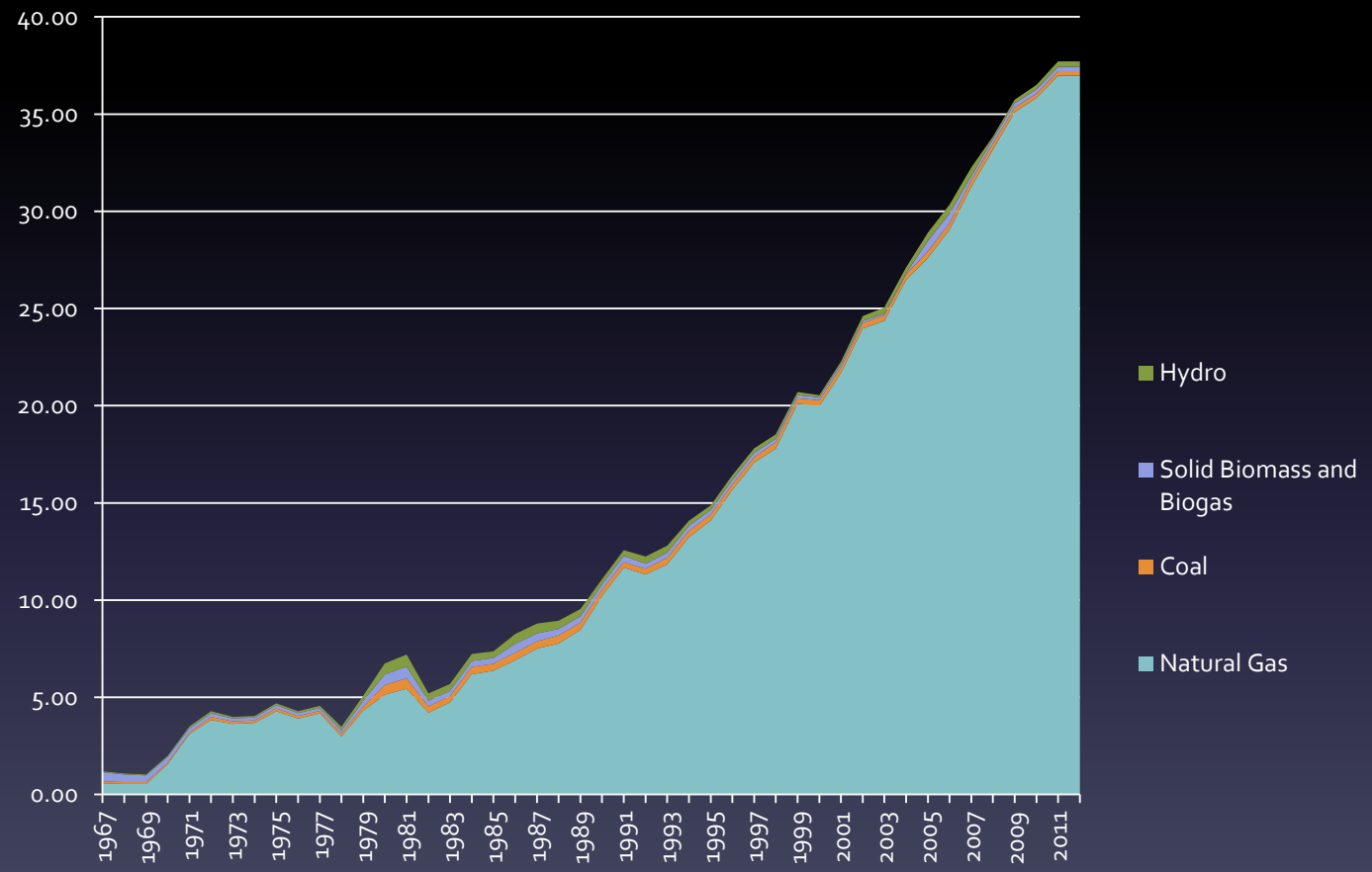

Barrels per Million Rials
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
1998-99
1999-2000
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
Energy Intensity in Iran (Barrels of oil equivalent per million rials, constant 2005 prices)
Source: Energy Balance, 2010

Primary Energy Supply Share of Sources (%) (1967-2012)

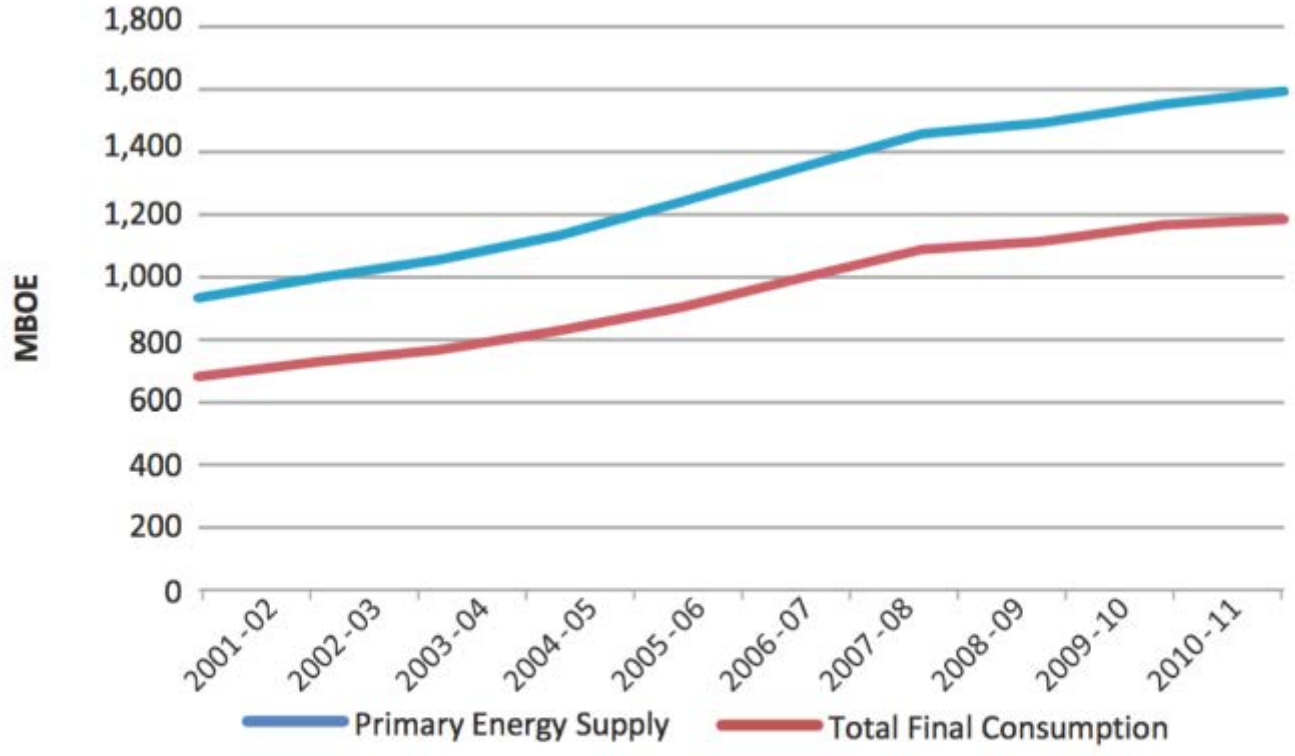


Source: National energy balance

Primary Energy Supply Sources % (1967-2012)
~~fuel Oil~~



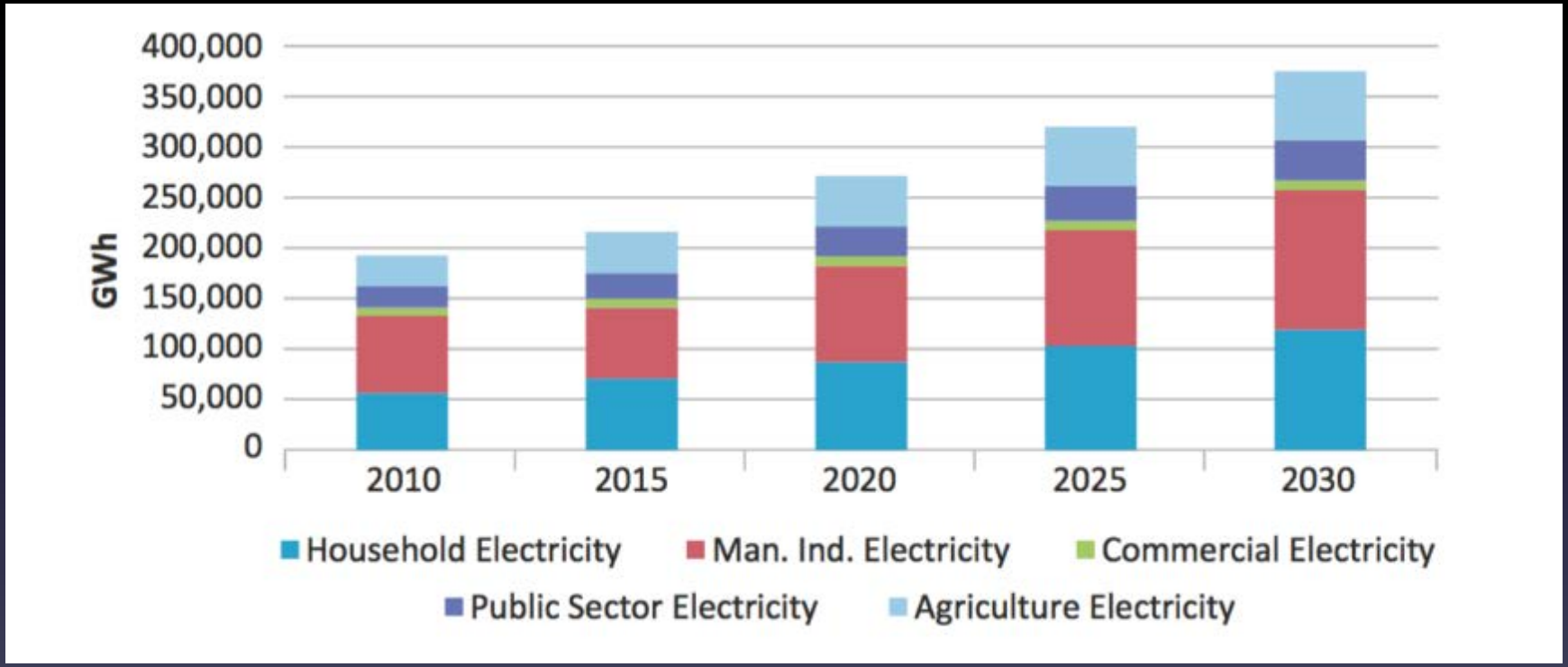
Source: National energy balance



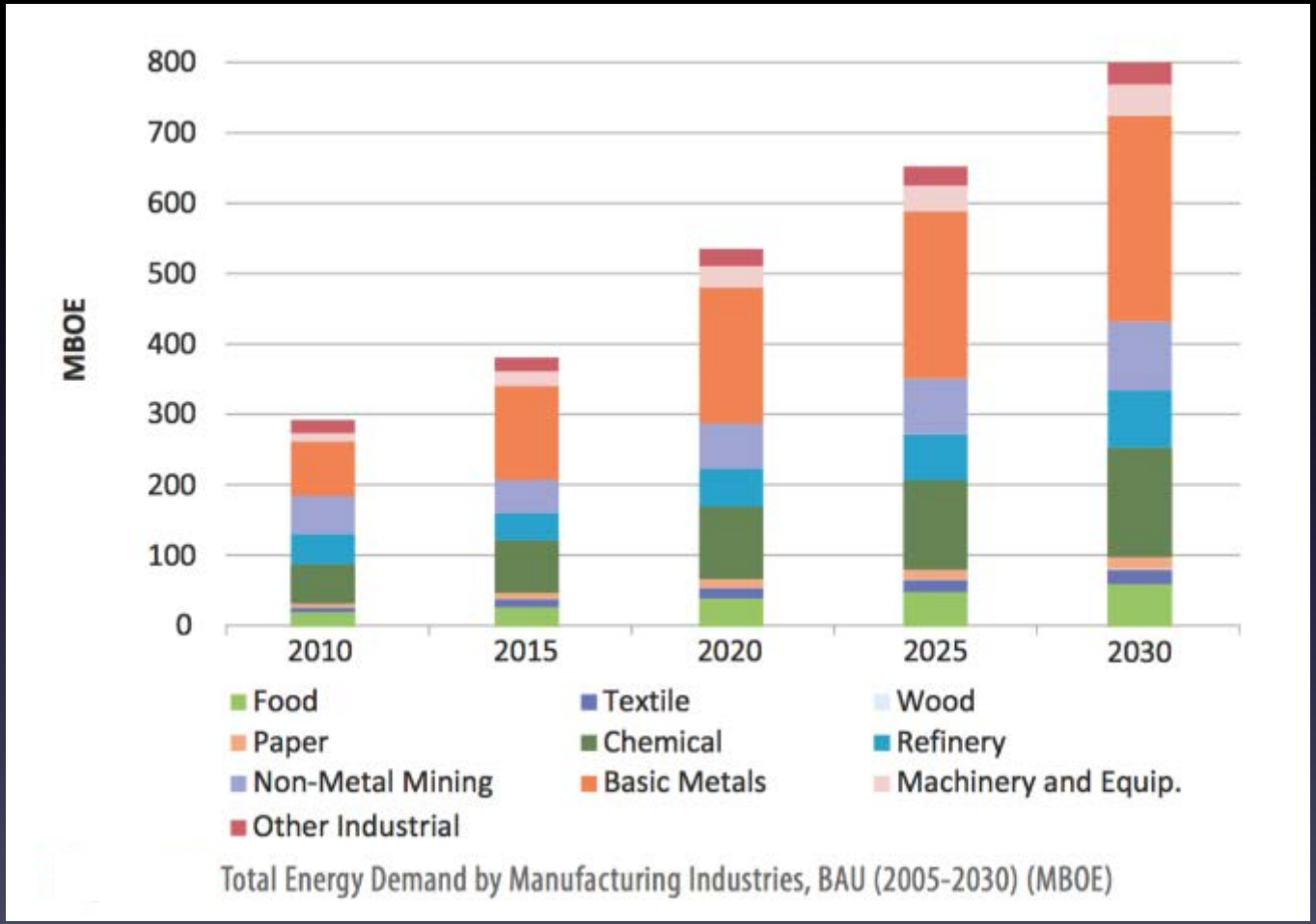
Primary Energy Supply and Final Consumption (MBOE) (2000-2010)

Source: Energy Balance (2005 & 2010)

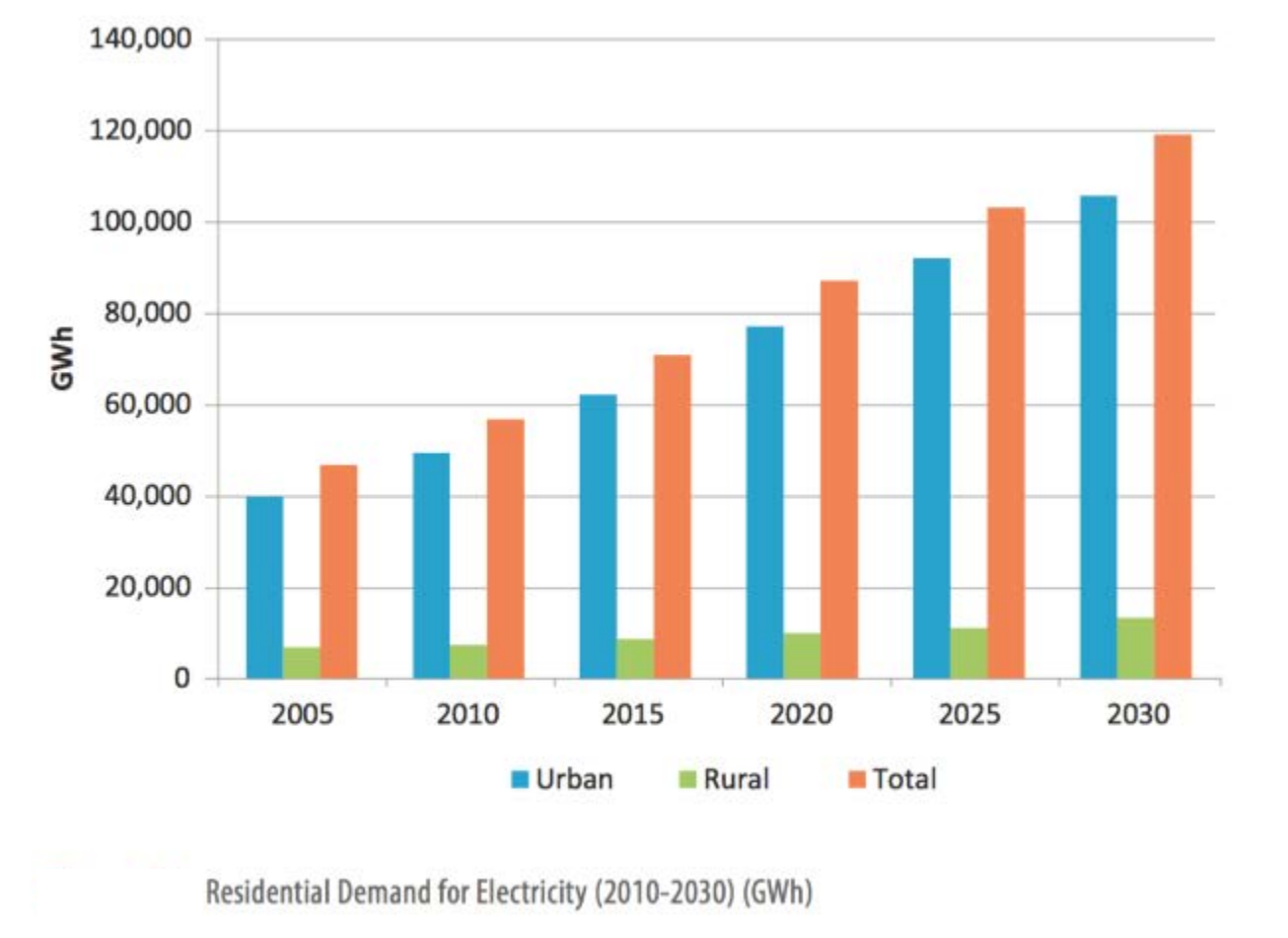
BAU scenario



Source: Wuppertal Institute

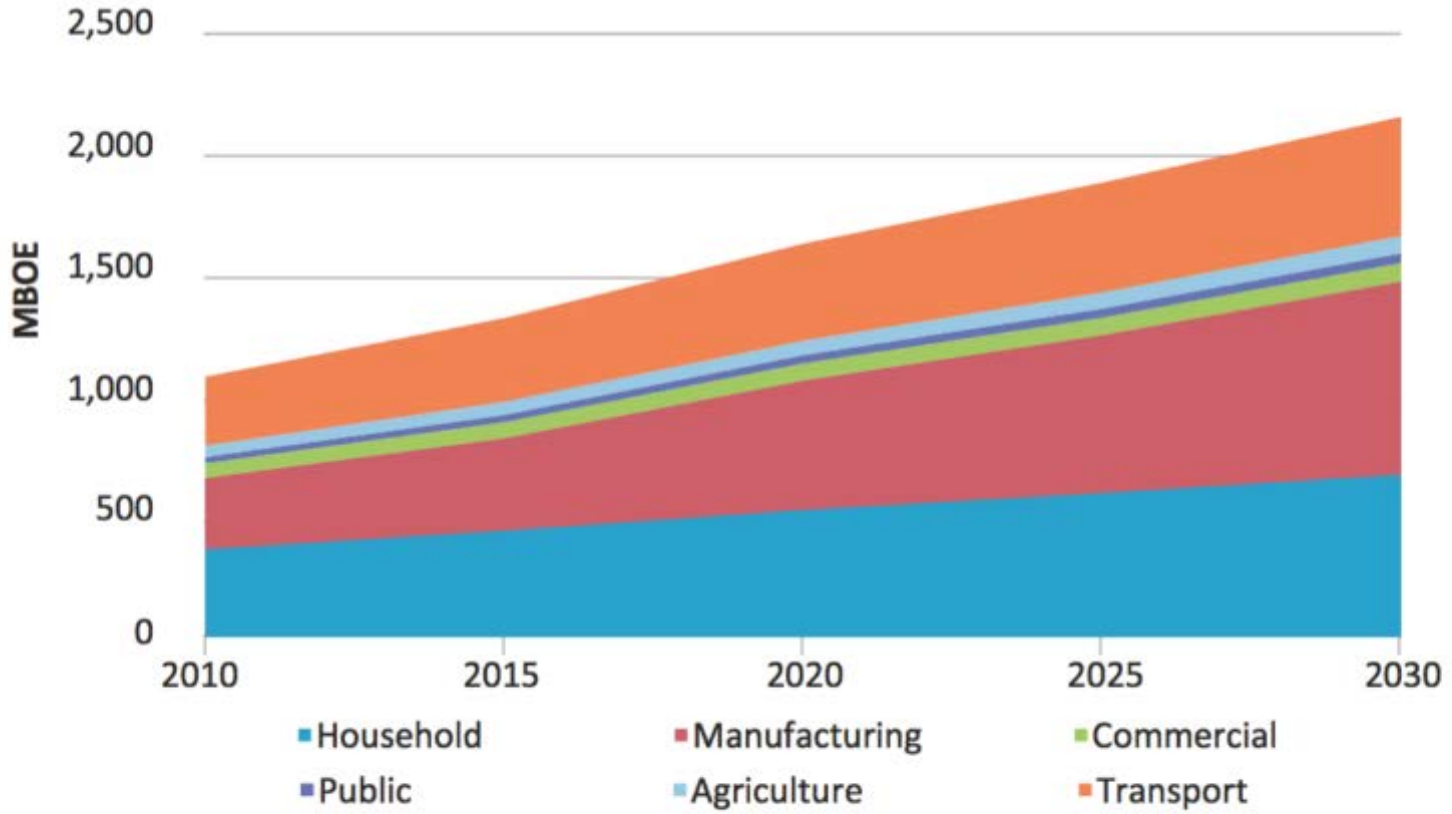


Source: Wuppertal Institute



Source: Wuppertal Institute

Final Energy Demand



Total Final Energy Demand by Sector, BAU Scenario (2010-2030) (MBOE)

Source: Wuppertal Institute

Energy Policies

- 1- Reduction of Energy Subsidies
- 2- Reduction of Oil export dependency
- 3- Energy Efficiency in buildings and industry
- 4- Renewable Energy Support

Energy Policies

6th Five –year plan:

A- Government must reduce the energy intensity in the following ways:

1- Energy efficiency in buildings 5% per year

2- development of petrochemical industry to capacity 100 million ton per year

3- Increasing the efficiency of power plants

4- Preparing the country wide energy roadmap by the end of the 6th plan

5- installation of 7500 MW Renewable Energy power plants and 5000 MW of Natural gas ones cooperating with private sector with support schemes

Feed-in-Tariffs of different Renewable and Clean Technologies

(in Rials per kWh

Each 3800 is about 1 $c

1	Biomass	landfill	2700
		Anaerobic Digestion	3500
		Incineration	3700
2	Wind farm	above 50 MW	3400
		50 MW and less	4200
		1 MW and less	5700
3	Solar farm	above 30 MW	3200
		30 MW and less	4000
		10 MW and less	4900
		100 KW or less	7000
		20 KW or Less	8000
4	Geothermal (including excavation and equipment)		4900
5	Waste Heat Recovery in industrial processes		2900
6	Small Hydro (10 MW and less)	River type	2100
		Water Transfer Pipe	1500

Feed in Tariff in the past year

- 1391 (2012) **1863** Rls /kWh
- 1392 (2013) **4442** Rls, applicable for **5-years** PPA
- 1393 (2014) **4628** Rls, applicable for **5-years** PPA
- 1394 (2015) **Diversified different tariffs for various technologies , with an average of 4873 Rls/kWh, applicable for 20-years PPA**

Iran's Development Targets on RE

- Development of a 5000 MW capacity by the next 5 years, is set as a main goal on RE by the Ministry of Energy.
- The goal will be achieved mainly by interaction of private sector through a Feed-in-Tariff system guaranteed by law.
- Ministry of Energy may increase its RE development goal to 7500 MW due to our contribution in climate change mitigation.

Legislation Support

- MOE has the mandate to announce the guaranteed tariffs based on a parliament legislation (Rational Use of Energy Law- Article 61)
- The required budget is also secured receiving Green Tax from electricity end users (Electricity Industry Support Law - Article 5)

Regulatory Framework

- The Cabinet has put a supportive regulation on RE development based on Parliament legislation (Cabinet approval)
- The FiT is announced by Ministry of Energy to include savings in fuel consumption and emission reduction as well as energy conversion costs (Article 1)

Localization privileges

- A maximum increase of 30% in FiT is applicable to the power plants that are constructed using
- Locally manufactured (10%) and
  Locally designed (10%) based on
  Locally knowledge development (10%) (Article 6).

An upper limit for each applicant

- The most suitable high RE quality big fields in Iran are state owned lands which could be leased for private sector installations for a very cheap cost !
- In order to avoid these cheap lands to be blocked by a limited number of applicants which prevents others to enter in, each applicant is advised to request for a maximum of 2 licenses at the first time.

How an applicant could contribute more

- The next licenses apart the ongoing 2, will be issued upon a progress in installation of the 2.
- The investor can continuously install the the next power plants.
- In a smooth and continuous work, there will be no limit for the investors who successfully operationalize their already licensed power plants.

In the time of payment, the contracted tariffs will be multiplied by the 3 ever increasing indices:

1. Internal Inflation Compensation Index which adjusts the payment based on Rial/Euro exchange rate fluctuations.
2. Peak Hours Coefficients which increases the price for those that inject their electricity during the peak hours. As solar and wind power plants normally generate more during peak hours, they benefit almost 20% more.
3. Local manufacturing Coefficient with a maximum of 1.30 for those using local engineering and equipments.

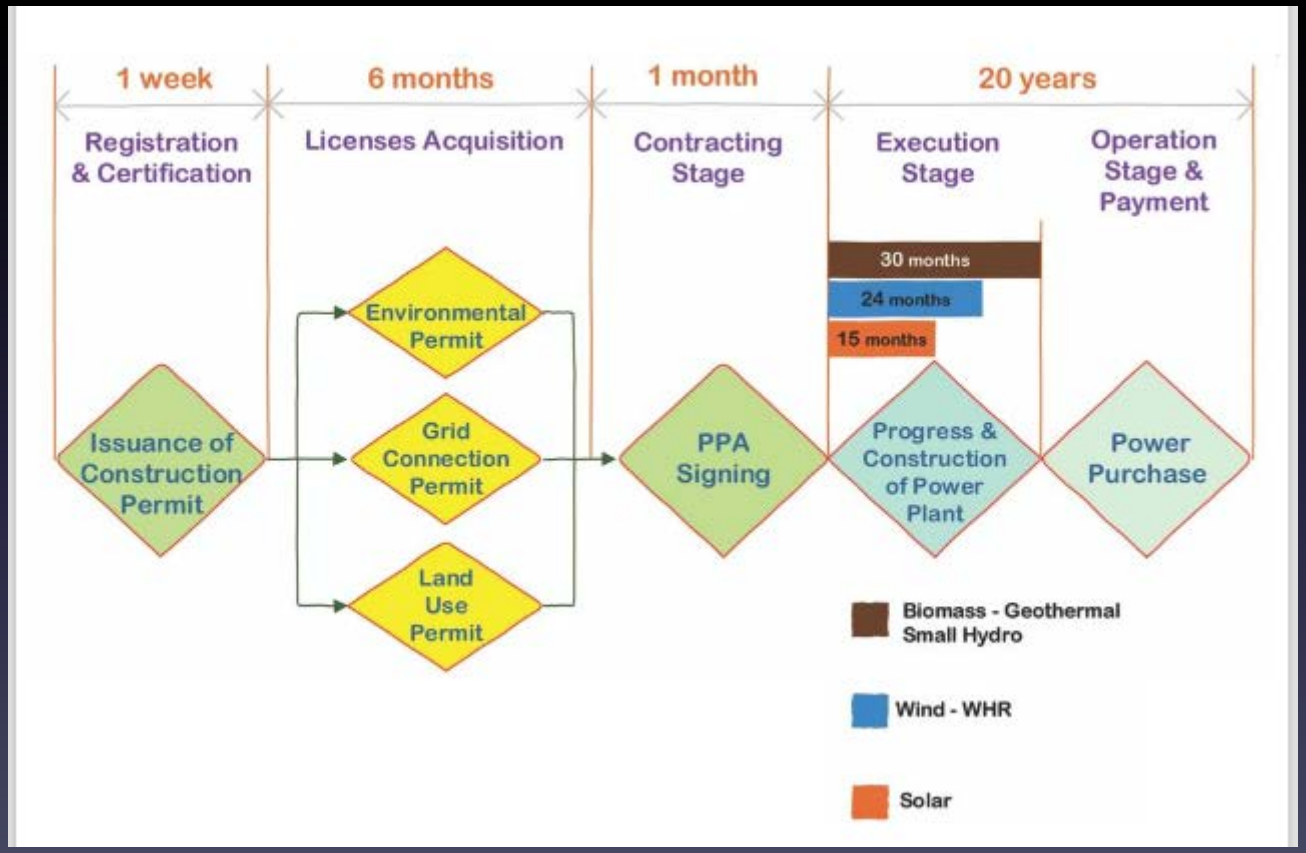
Avoided Transmission Cost Compensation

- For the generations connected to the distribution (low voltage) grid, 148 Rls per kWh will be added to the Base Tariff as avoided transmission service fee.

Other points of PPA

- In any time during and after the PPA period, the power plants are permitted to sell their electricity to the Electricity Market, to a third party or even export from Iran.
- MOE's policy is to reduce the tariffs in a smooth manner in proportion with increase in installed capacities. However this does not affect the previous signed PPAs.
- Power plants should be operational at full capacity within 15 to 30 months (depending on the type) since the date of signing the PPA. For Geothermal and Biomass power plants, this period can be extended up to more 9 months. In case of delay, the current ongoing tariffs at the time of operationalization, will be applied to the remaining period of the PPA.

Project Timeline



Source: SUNA

Foreign Investment Promotion and Protection Act (FIPPA)

- The law protecting foreign investment in Iran is the Foreign Investment Promotion and Protection Act ratified in 2002 which is referred to as FIPPA.
- The scope of applicability of the FIPPA extends to all foreign investors who may invest in Iran and enjoy the privileges available there under.
- FIPPA allows investors to invest with greater confidence, covering all political risks.

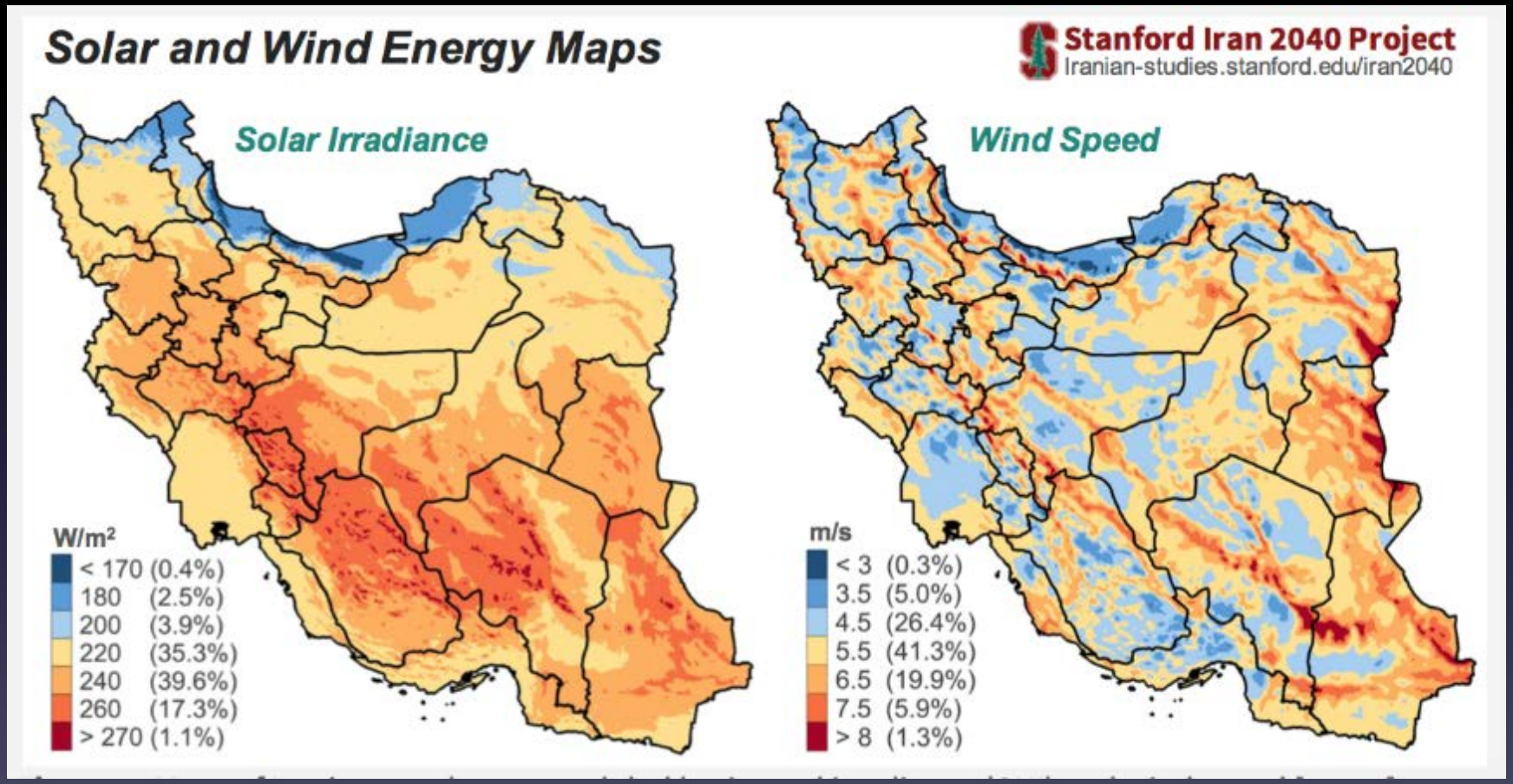
Deployment of RE Powerplants March 2017

		Wind	Solar	Biomass	Small Hydro	Waste Heat Recovery	Total
Operational	Capacity (MW)	213	37	11	31	15	340
	No. of PP	6	7	5	4	3	27
Those having a valid PPA (MW)		710	570	70	86	93	1539

RE Potential

- Iran has an outstanding DNI (direct normal irradiation) of up to 5.5 kWh/sqm/day and an average of 300 sunny days per year. In particular the central and southern regions of Iran have high solar irradiation, such as the provinces of Yazd, Fars and Kerman with a DNI of about 5.2 to 5.4 kWh/sqm/day. Similarly, there is huge potential for harnessing wind energy. According to a SUNA (SATBA) potential installed capacity of wind power to be 30,000 MW

Solar and Wind maps



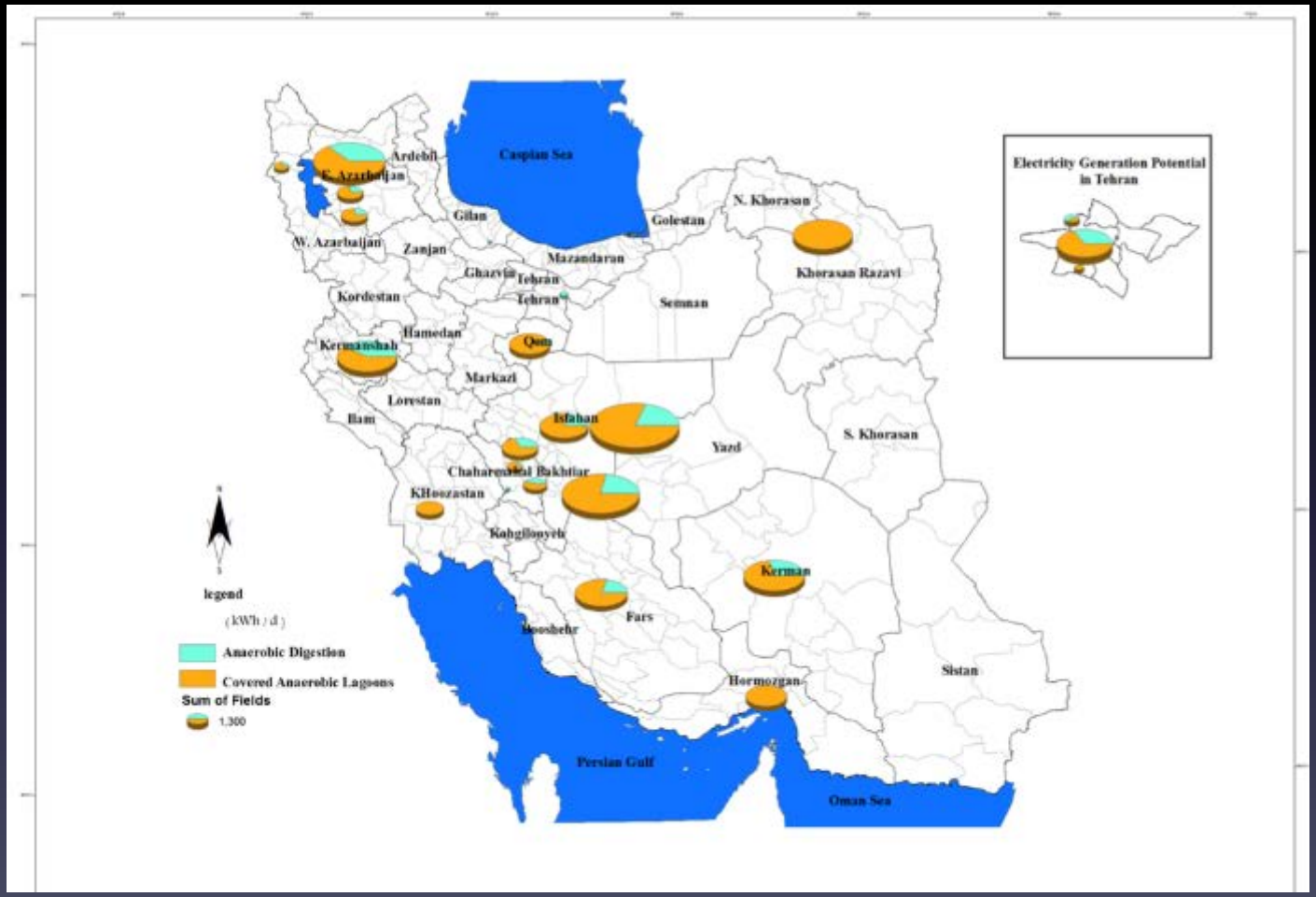
Geothermal Potential

Source: SUNA data Figure : Wuppertal Institute

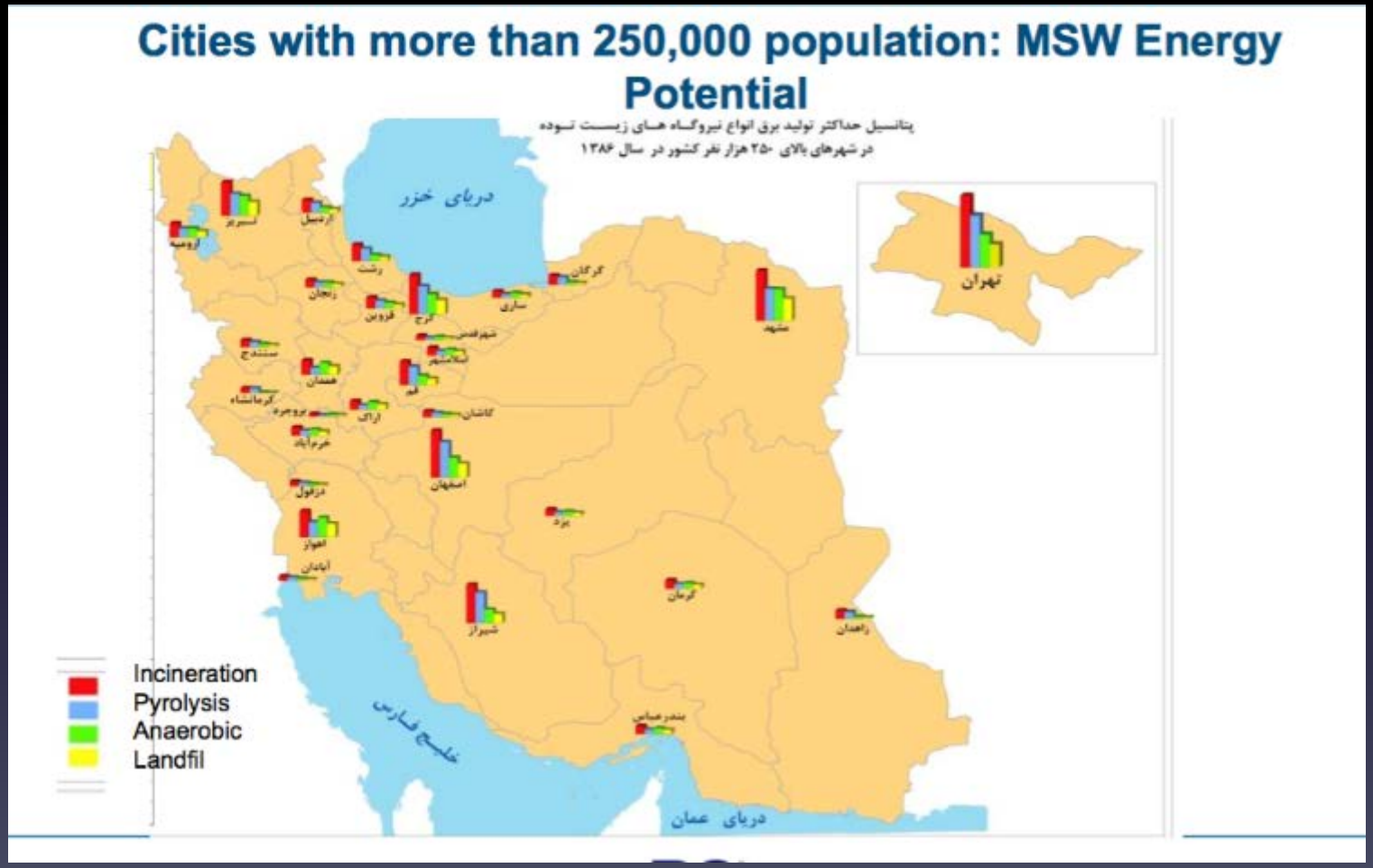
Biomass Map


Ardebil
E. Azarbaijan
W. Azarbaijan
Gilan
Zanjan
Ghazvin
Tehran
Kordestan
Hamedan
Kermanshah
Markazi
Lorestan
Ilam
Qom
Golestan
Mazandaran
N. Khorasan
Khorasan Razavi
Semnan
Isfahan
Yazd
S. Khorasan
Kerman
Sistan
Hormozgan
Legend
tonne/year
411217 - 700000
700000 - 1100000
1100000 - 1750000
1750000 - 2300000
2300000 - 3600000
3600000 - 6400000
6400000 - 10000000

Wastewater Energy Recovery



MSW Energy Recovery



Briefing Opportunities and Challenges:

Opportunities:

- CO_2 reduction and ambient air quality improvement
- Meeting the electricity needs
- Displaced fuel revenues
- Foreign investment growth and international opportunities
- Technology and knowledge import
- INDC 4 to 12 Percent reduction

- **Challenges**

- Competitive RE production
- Realization of energy prices (Subsidies removal)
- Bankability of projects

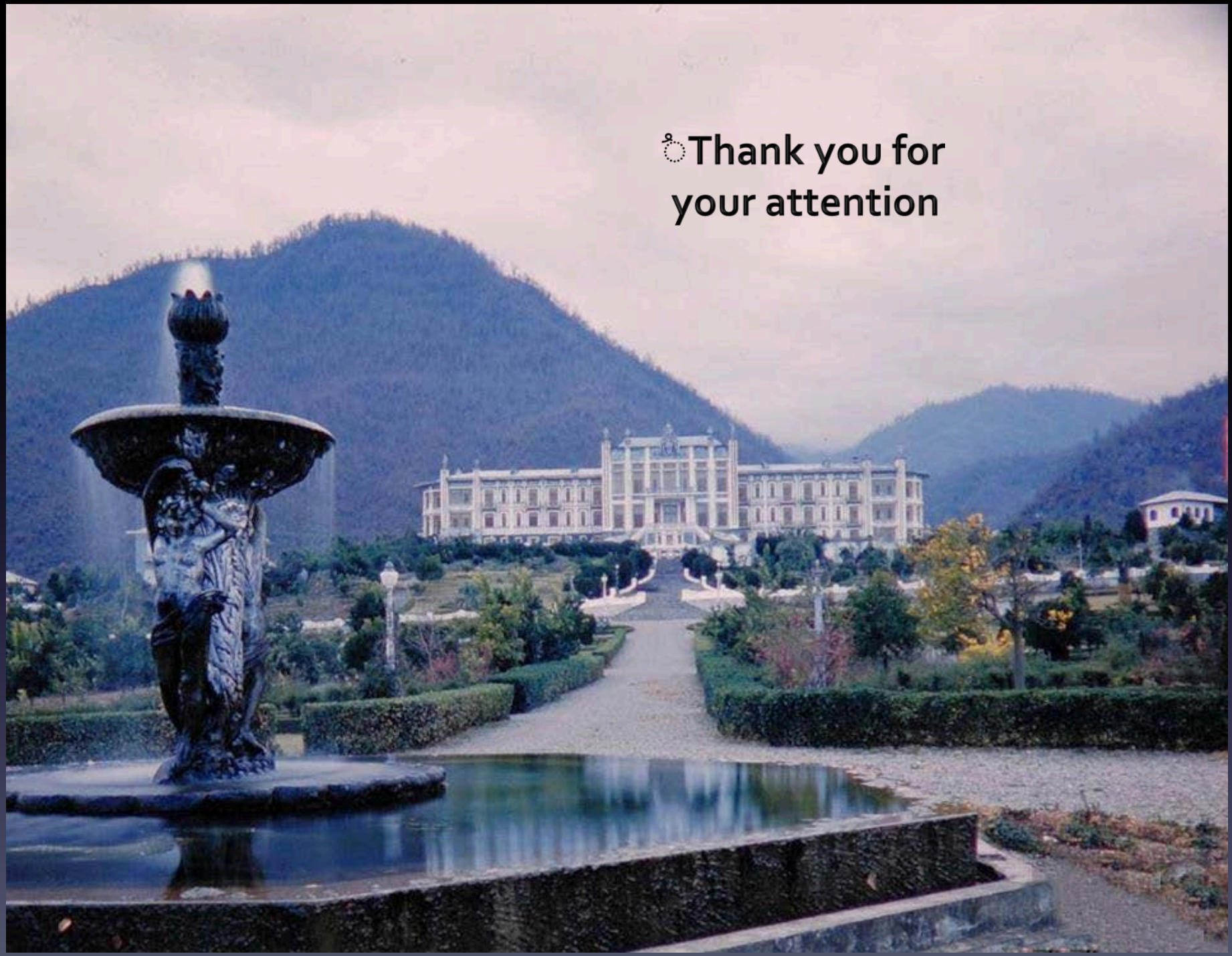
Market Integration

- In the long time, market integration of REs means that investment in REs production should be driven by market prices.

- As for now and in the near future, RES production is in most cases not competitive, RES investments remain mainly be driven by support.

Conclusions

- Iran's high level of energy consumption and CO_2 emissions, and costly electricity production by fossil fuels which are highly subsidized by the government, are just some of the reasons why Iran's policymakers are keen to utilize Iran natural potential to attract private sector investments in the renewable energy market.


♂Thank you for
your attention

Questions and Comments