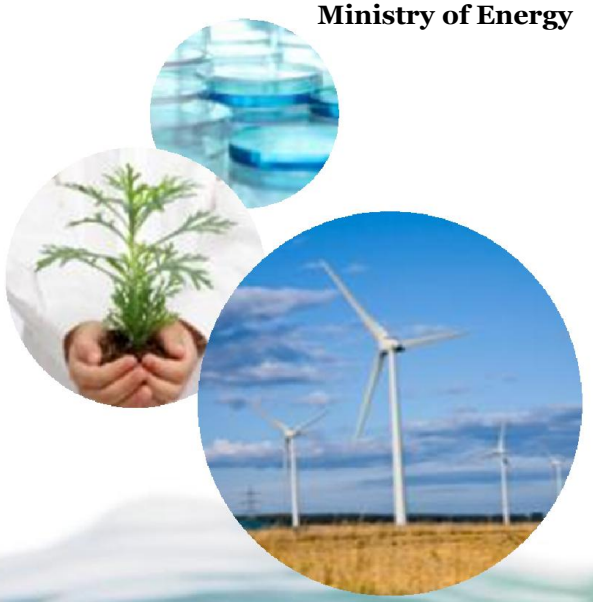
In the name of GOD

Islamic Republic of Iran
Ministry of Energy

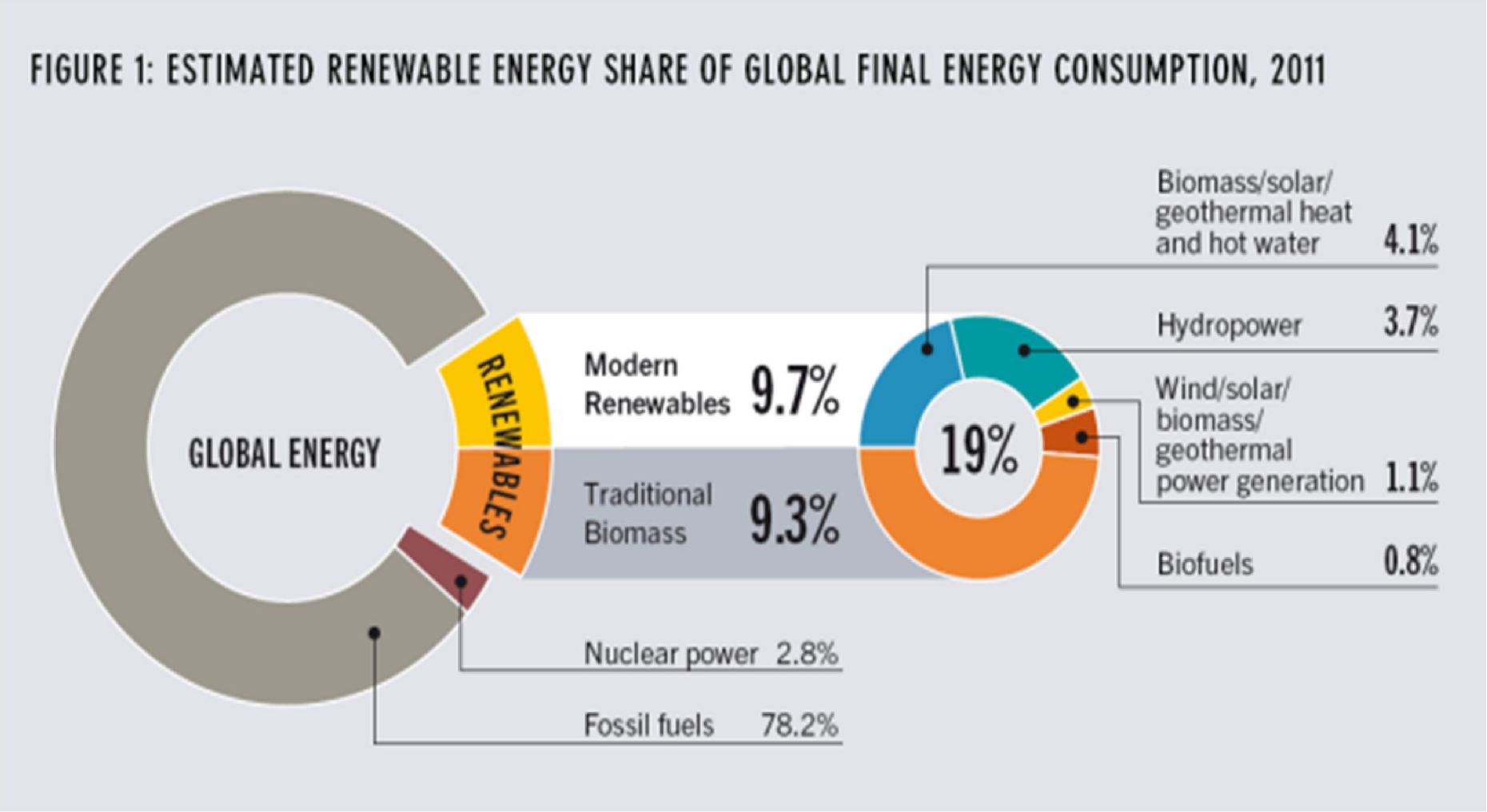


Investment Opportunities and Incentives in Power Industry

2nd Business Forum Iran Europe

March 2016

World Energy Generation at a Glance



The WEC's World Energy Scenarios to 2050

1-Energy system complexity will increase by 2050

2-Energy efficiency is crucial in dealing with demand outstripping supply

3-The energy mix in 2050 will mainly be fossil based

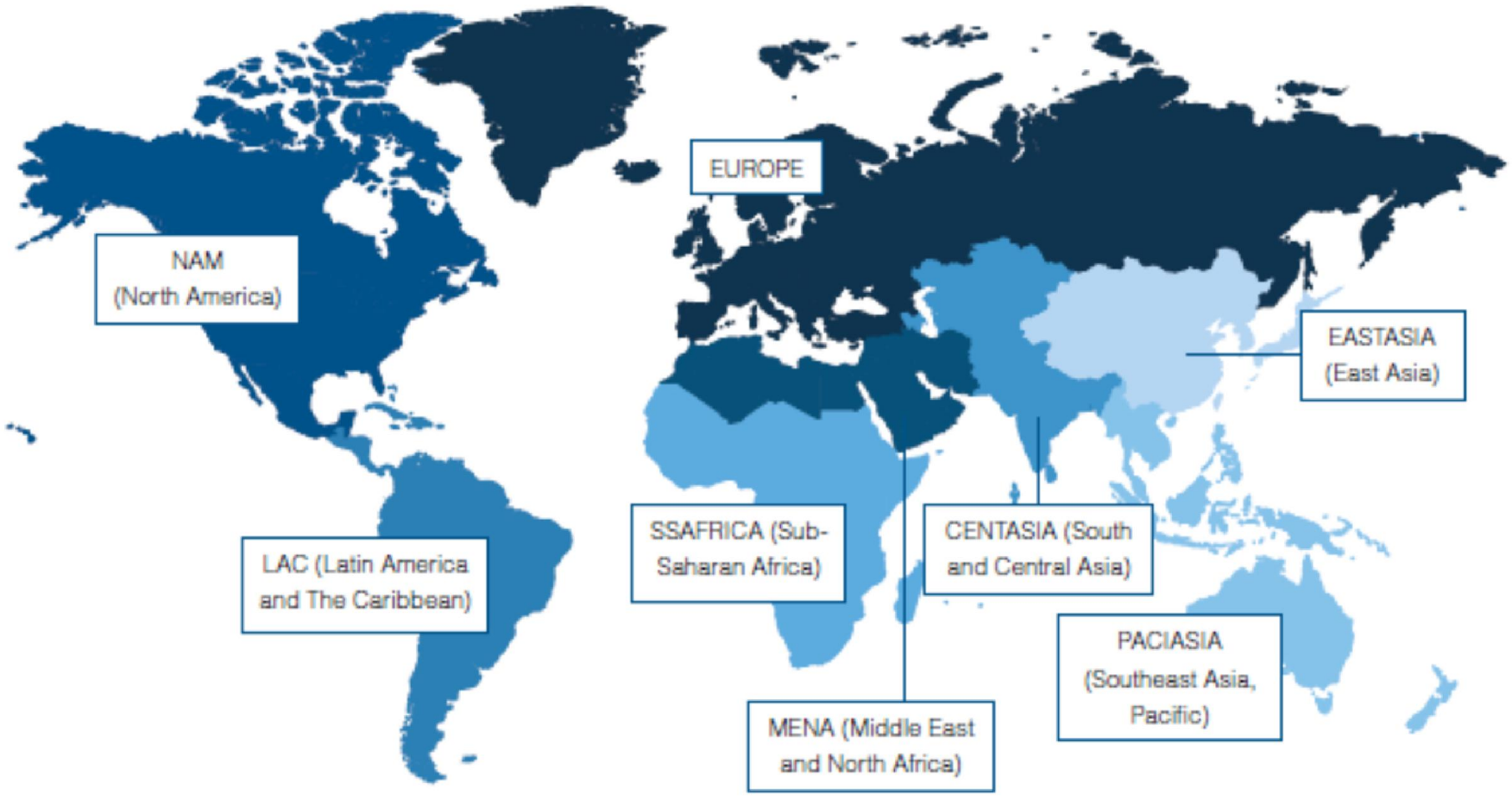
4- A low-carbon future is not only linked to renewable: CC(U)S is important and consumer behavior needs changing

5- Balancing the energy trilemma means making difficult choices

6- Functioning energy markets require investments and regional integration to deliver benefits to all consumers

7- Energy policy should ensure that energy and carbon markets deliver

Regions

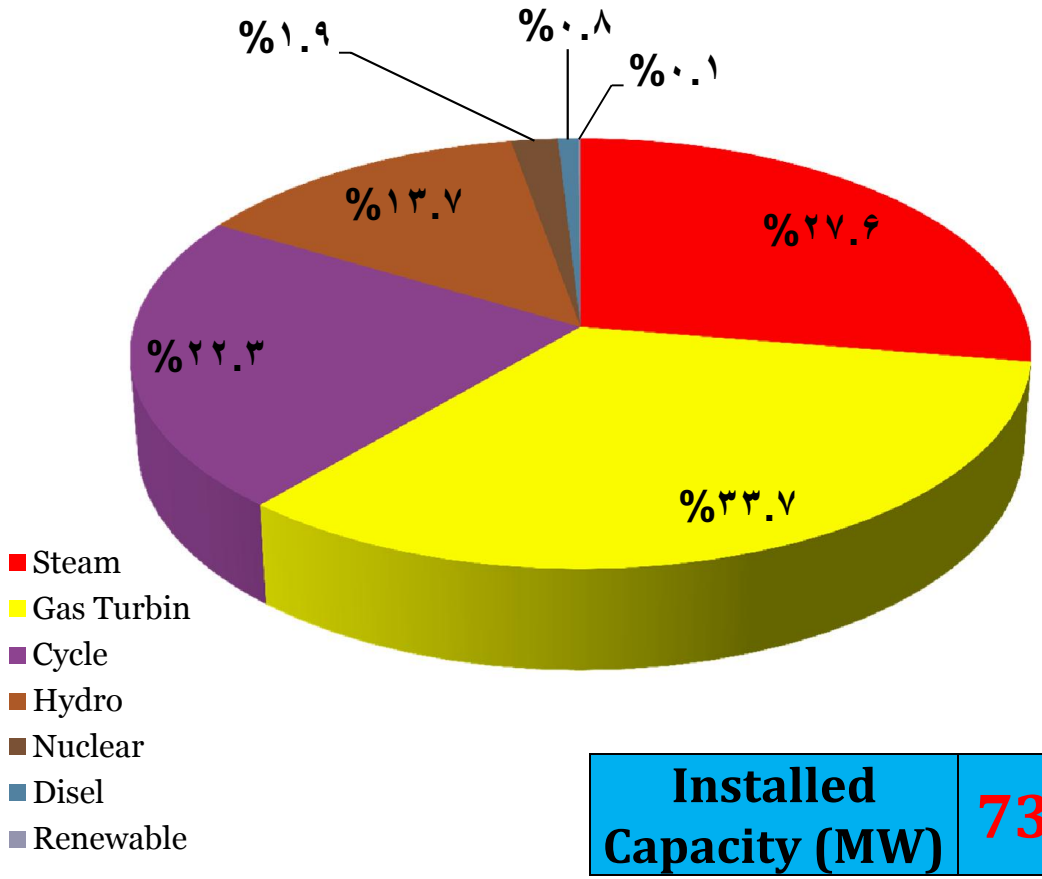

EUROPE
NAM
(North America)
EASTASIA
(East Asia)
SSAFRICA (Sub-
Saharan Africa)
CENTASIA (South
and Central Asia)
LAC (Latin America
and The Caribbean)
PACIASIA
(Southeast Asia,
Pacific)
MENA (Middle East
and North Africa)

The WEC's World Energy Projection to 2050

TOTAL ELECTRICITY GENERATION (Units: TWh/y)									
Region	2010	2020	2030	2040	2050	2020	2030	2040	2050
Middle East and North Africa	1,150	1,445	1,951	2,693	3,644	1,485	1,911	2,476	3,314
South and Central Asia	1,331	1,861	2,881	5,055	8,429	1,749	2,476	4,339	6,560

CARBON PRICE (US$2010/tCO$_2$)								
Region	2020	2030	2040	2050	2020	2030	2040	2050
Middle East and North Africa	0	5	10	23	10	23	42	70
South and Central Asia	0	5	10	23	10	23	50	75

Current state of Iran Electricity Generation (Nominal Capacity) 2015



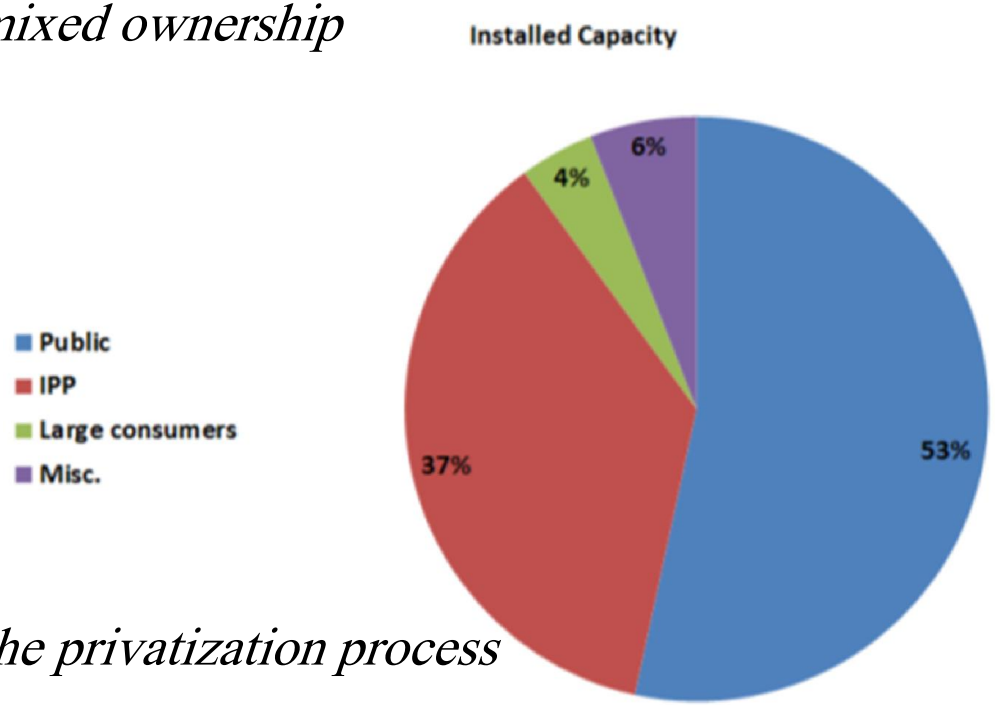
Type	Number of Power Plant
Steam	19
Gas Turbin	40
Cycle	14
Hydro	37
Nuclear	1
Disel	-
Renewable	6
Total	115

Installed Capacity (MW)	73000

Current state of Iran Electricity industry

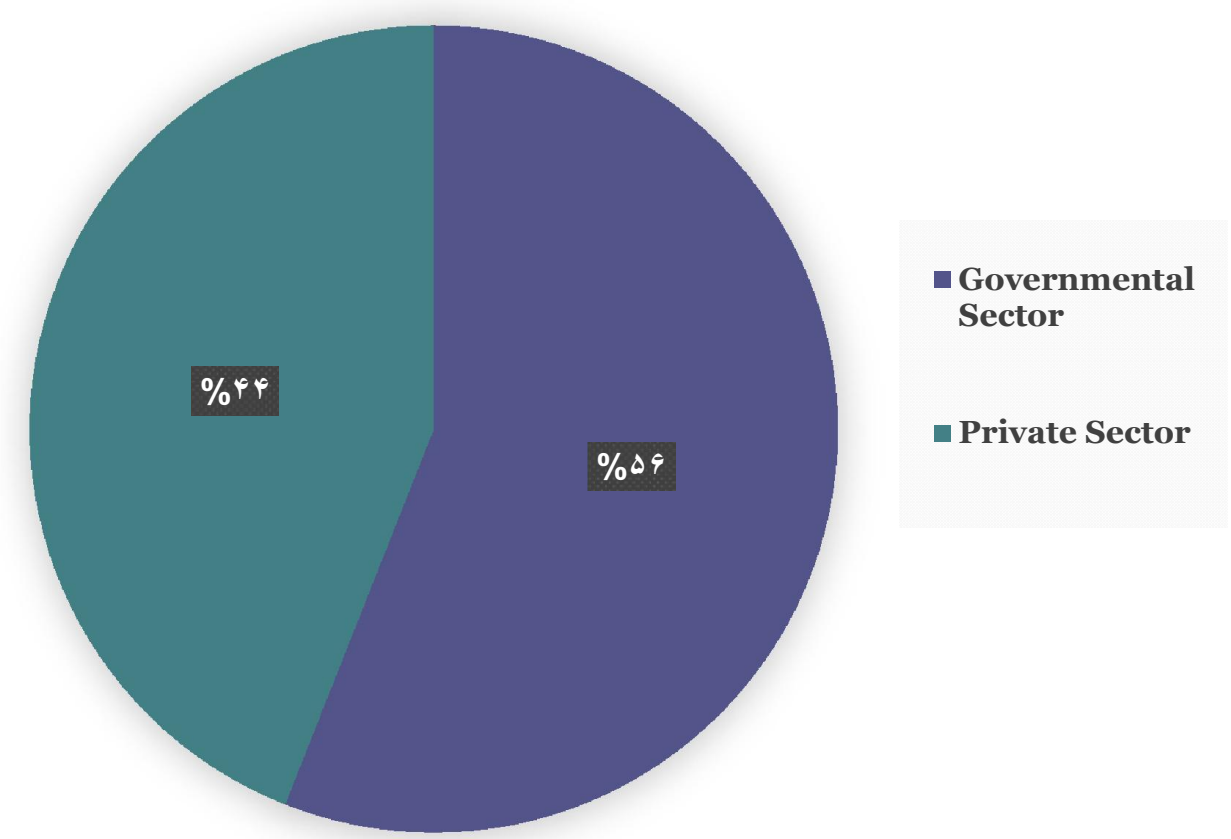
-- Generation

- *Private-Public mixed ownership*



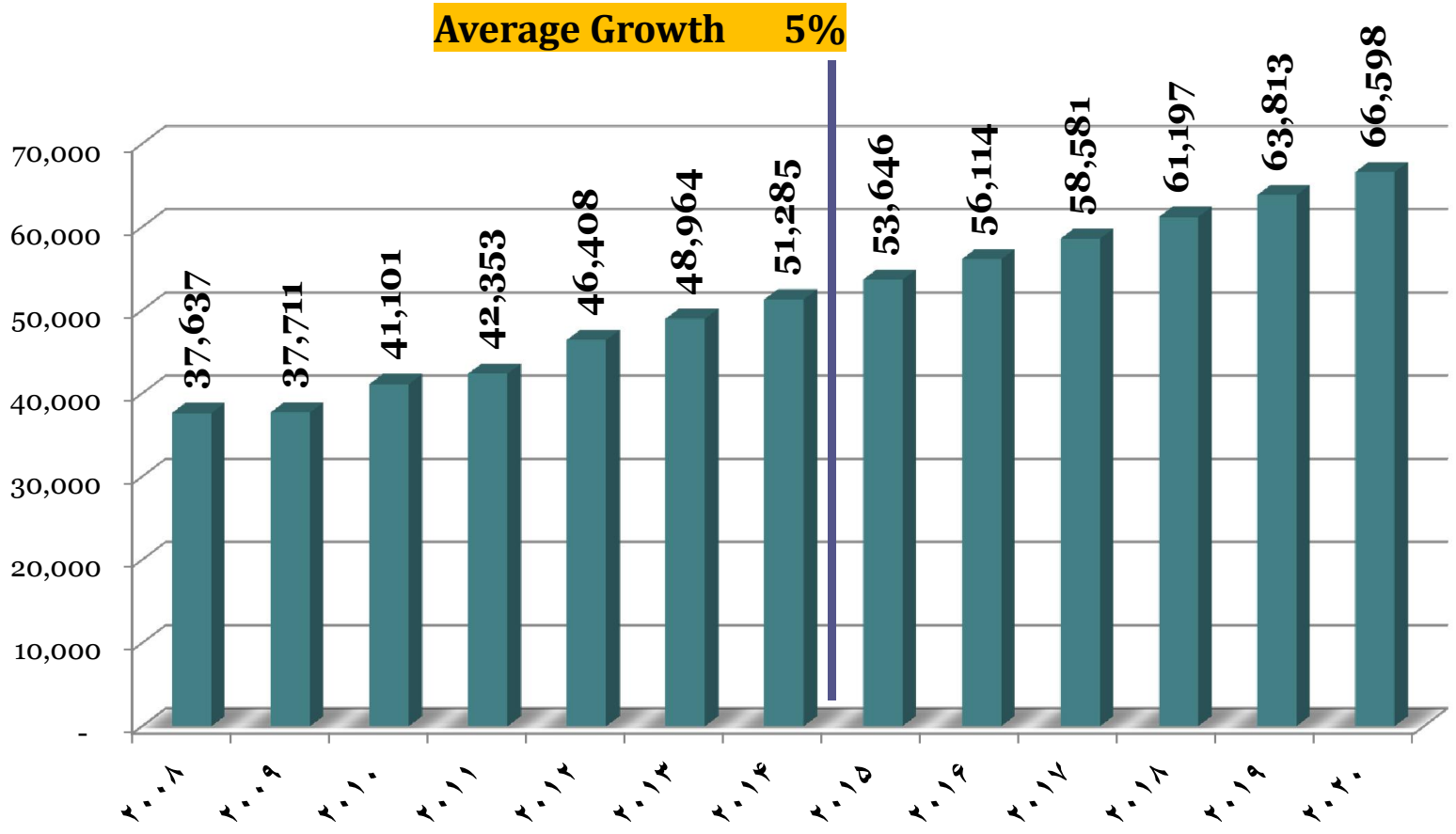
- *Still following the privatization process*
- *According to the long term strategy 80 percent of install capacity should be invested by private Sector*
- *By now, all the private power plants are thermal*

Review on the Current Status of Power Industry



Current state of Iran Electricity industry

Peak Consumption (MW)



Current state of Iran Electricity industry

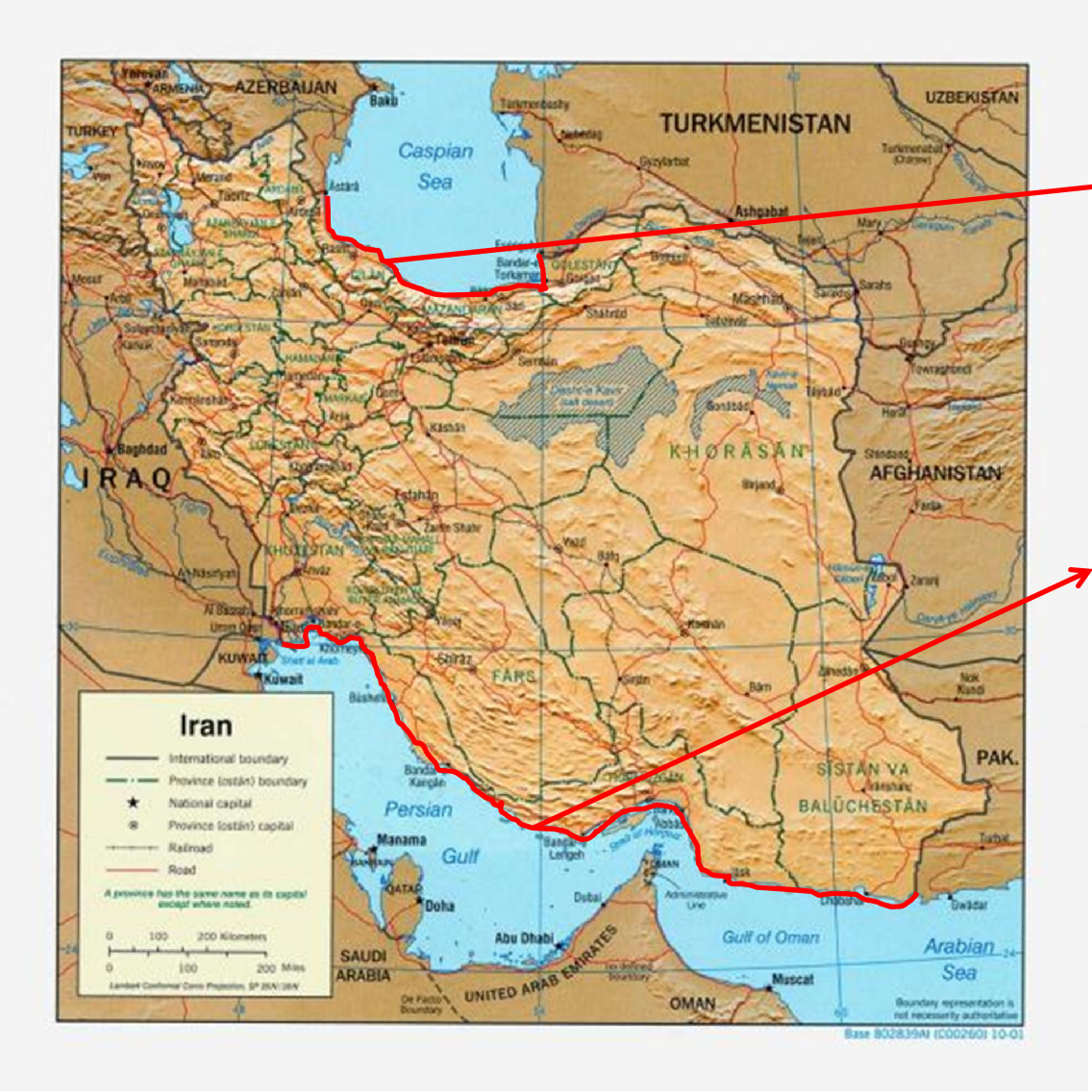
– Thermal Generation Efficiency

Type	Efficiency %
Steam	36.7
Gas Turbine	31.0
Combined Cycle	45.3
Disel	31.2

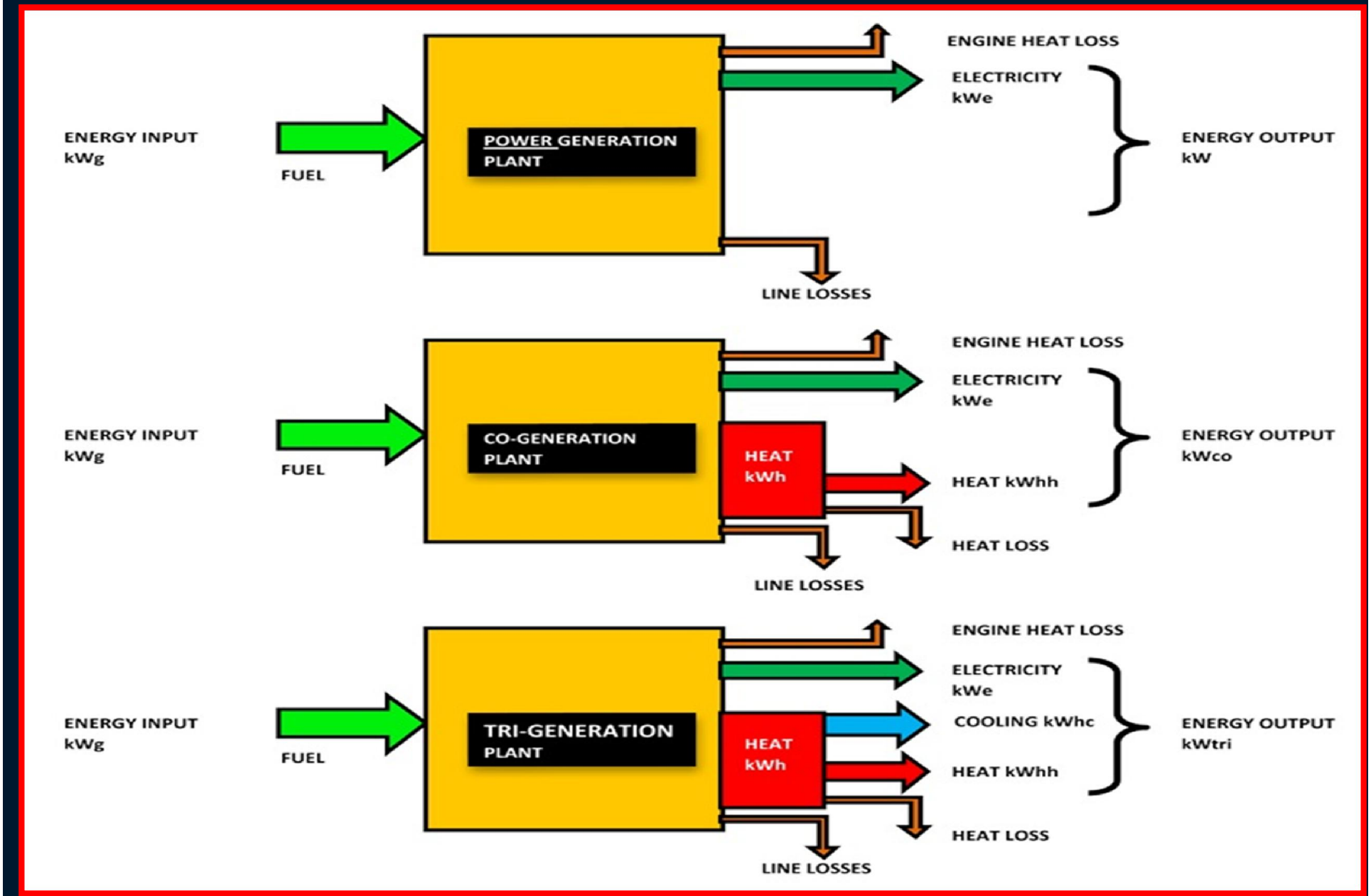
2012	
Average	37.2

2020	
Average	44

Potential for Water and Electricity Supplying



CCHP and Energy Output Efficiency



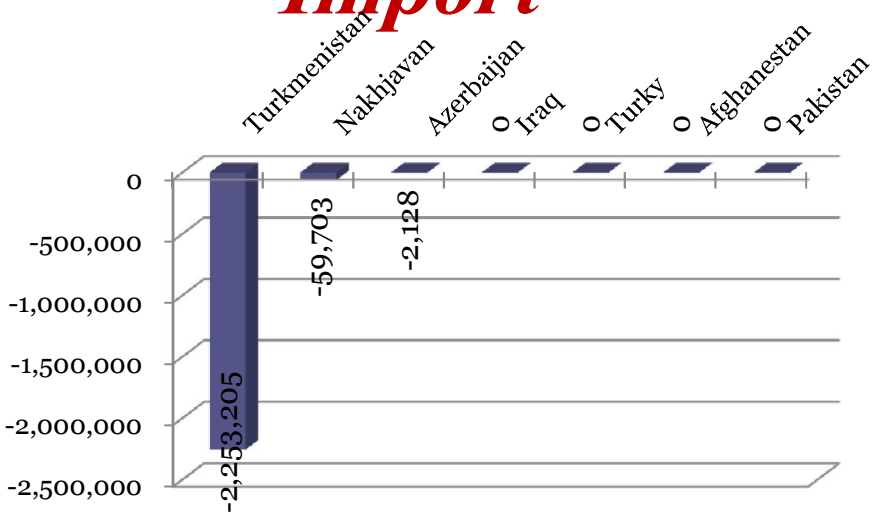
West, Central and South Asia

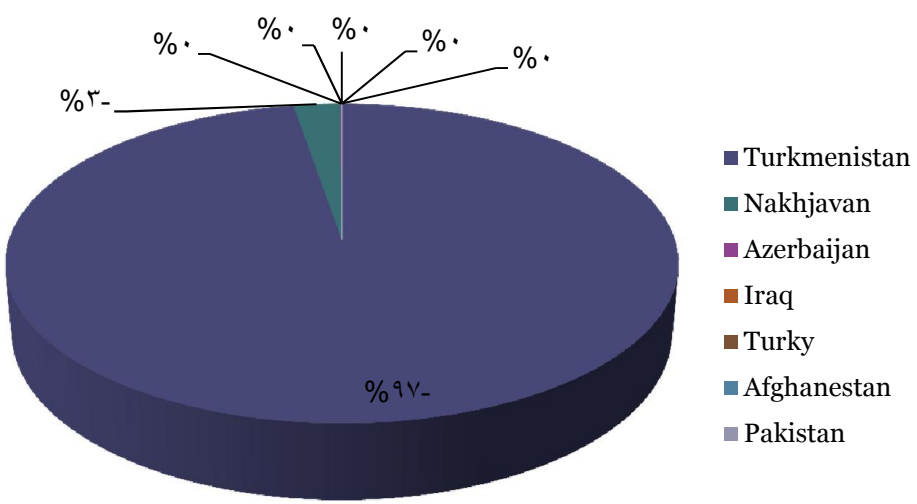
Existing Interconnections:

Azerbaijan
Turkey
Turkmenistan
Afghanistan
Pakistan
Iraq

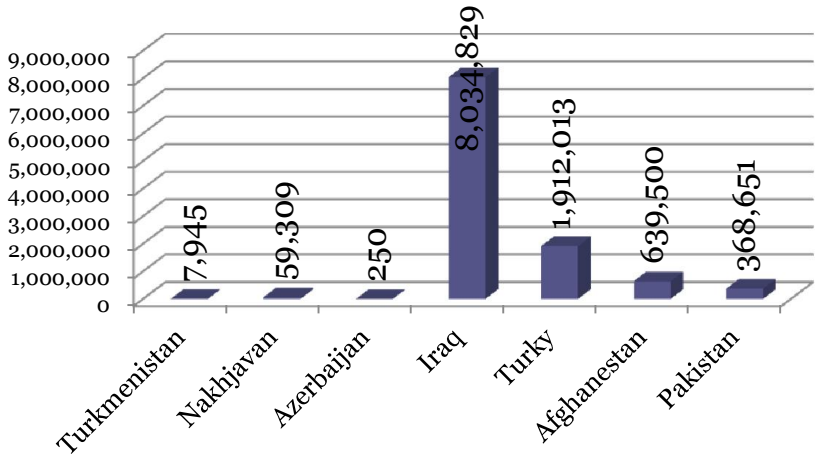
Current state of Iran Electricity industry

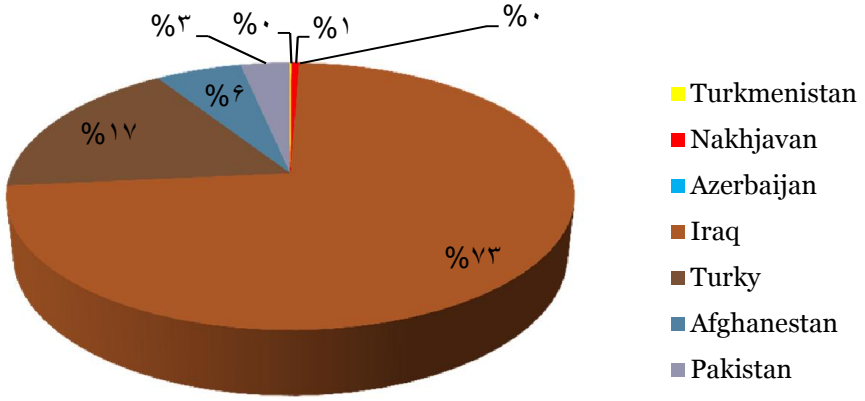
Import



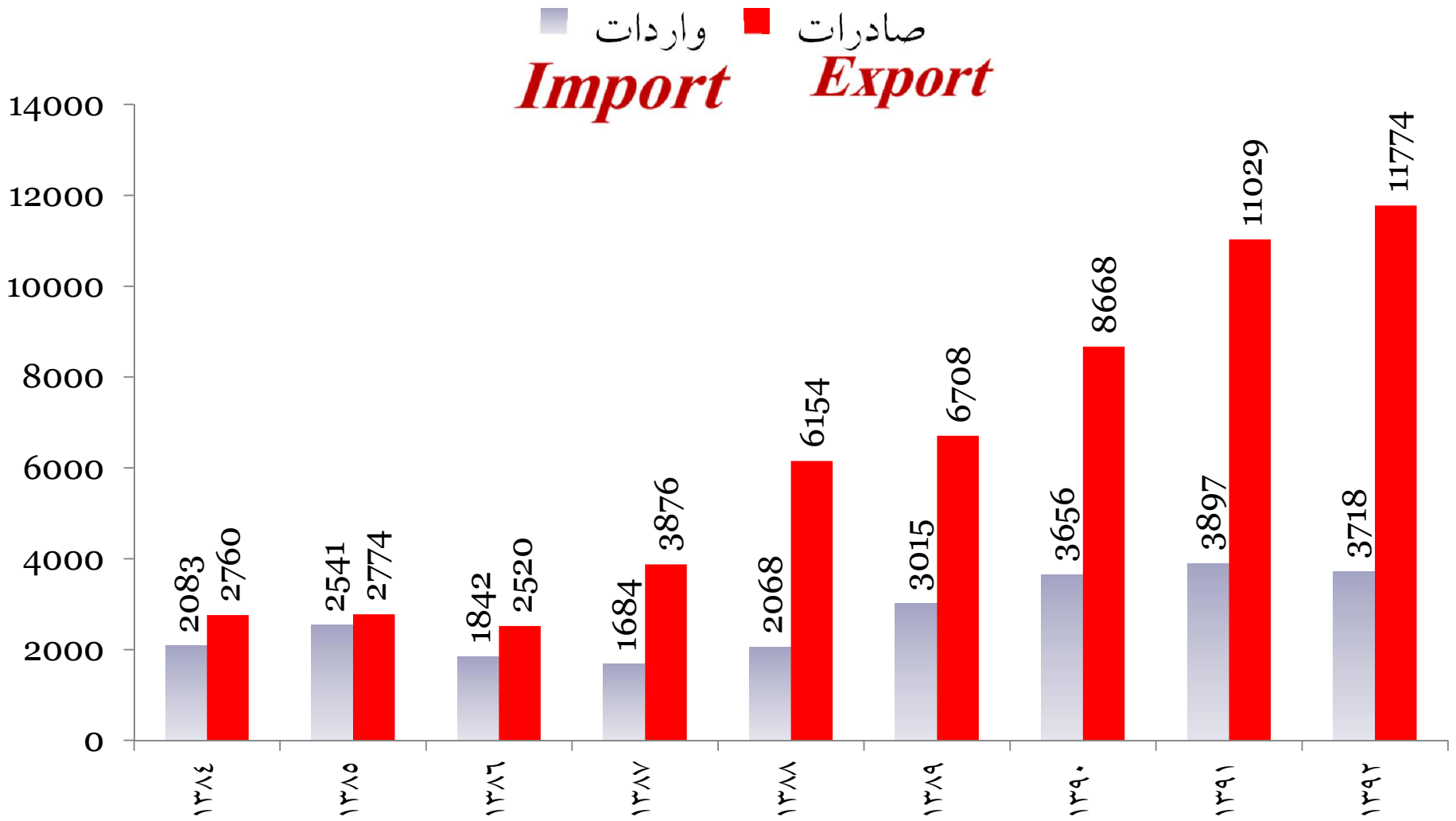


Export





Export and Import Electricity with Neighboring Countries

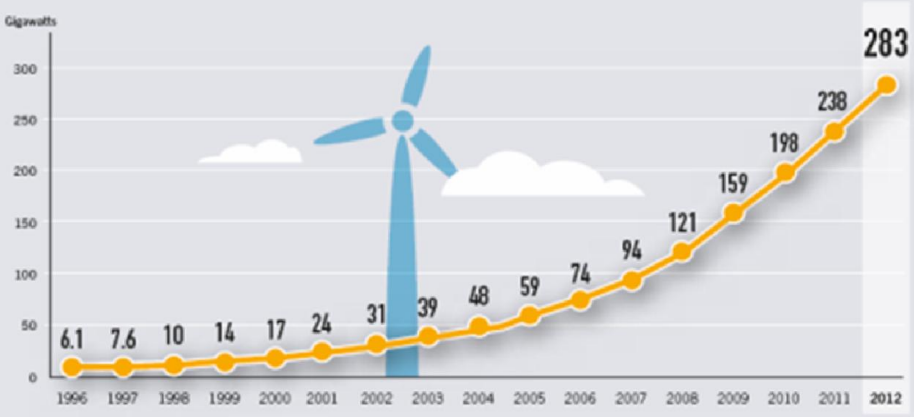


Renewable Energy

World Situation

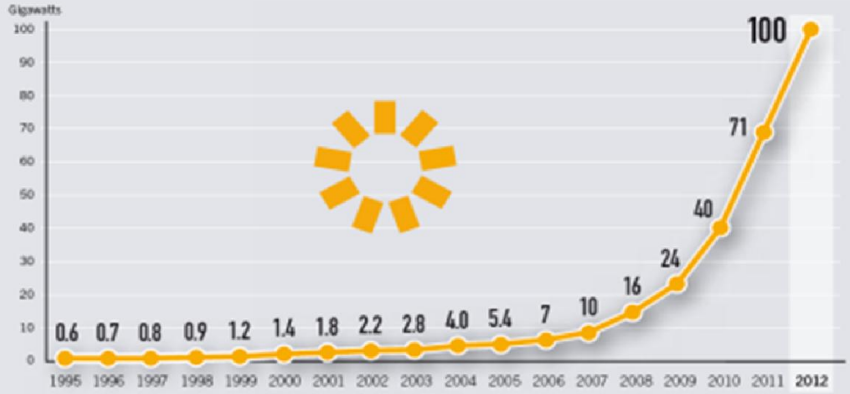
WIND POWER

FIGURE 18. WIND POWER GLOBAL CAPACITY, 1996-2012

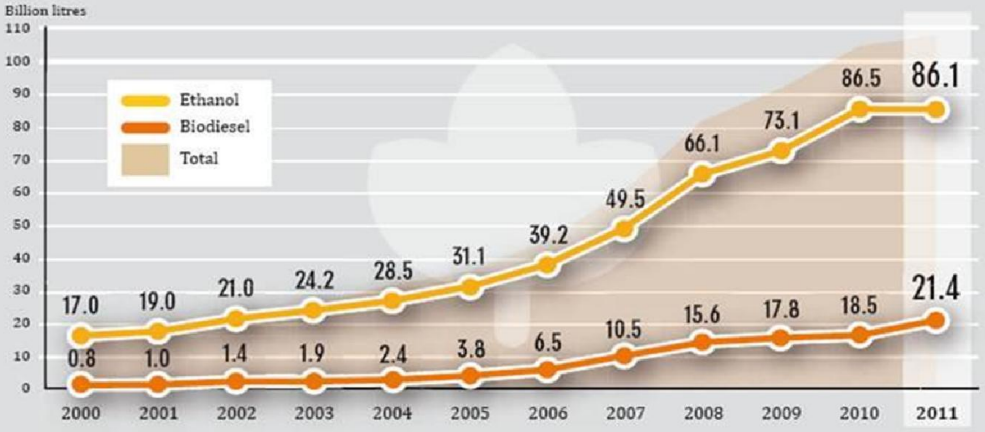


SOLAR PHOTOVOLTAICS (PV)

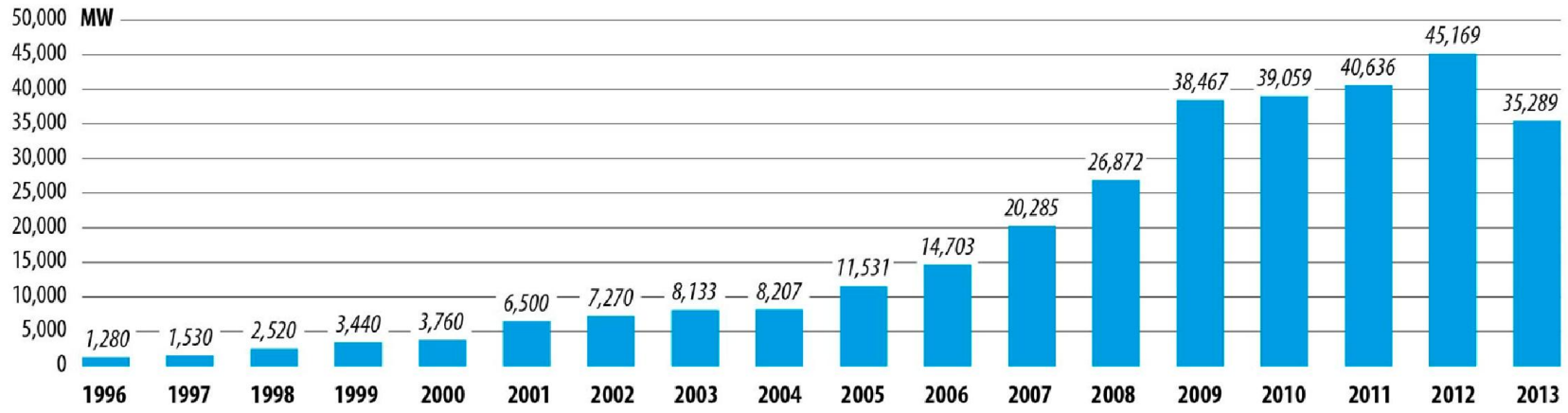
FIGURE 11. SOLAR PV GLOBAL CAPACITY, 1995-2012



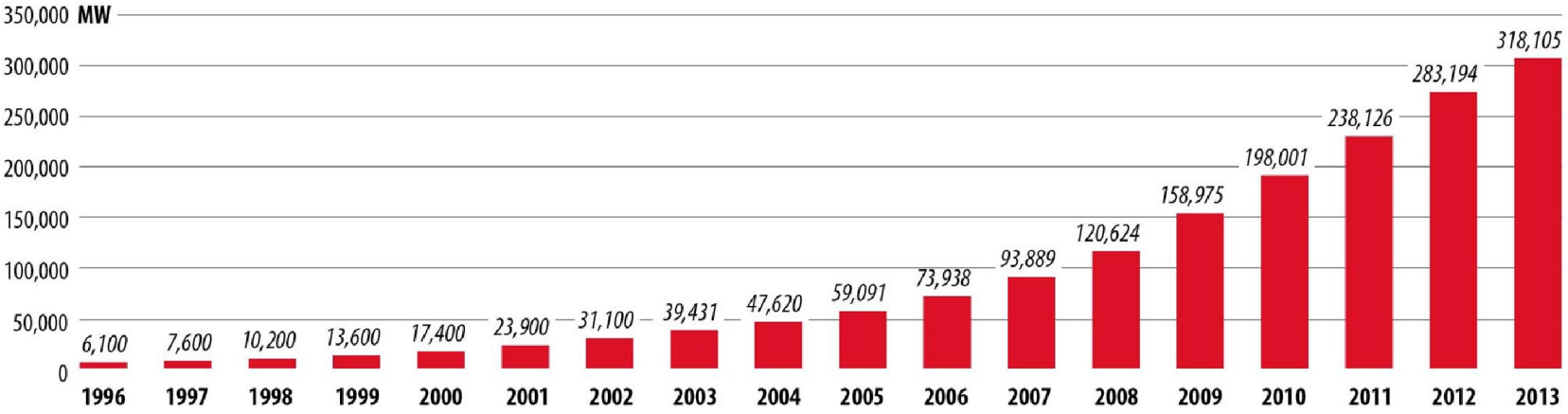
ETHANOL AND BIODIESEL PRODUCTION, 2000–2011



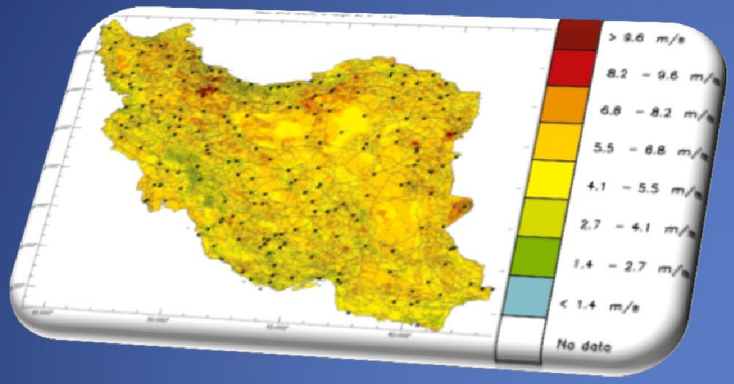
GLOBAL ANNUAL INSTALLED WIND CAPACITY 1996-2013



GLOBAL CUMULATIVE INSTALLED WIND CAPACITY 1996-2013



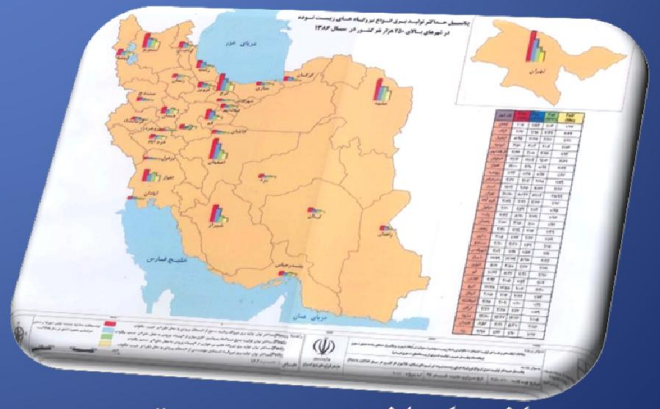
پتانسیلهای انرژی بادی، خورشیدی، زمین‌گرمایی و زیست‌توده



پتانسیل انرژی بادی

پتانسیل انرژی خورشیدی

پتانسیل انرژی زمین گرمایی

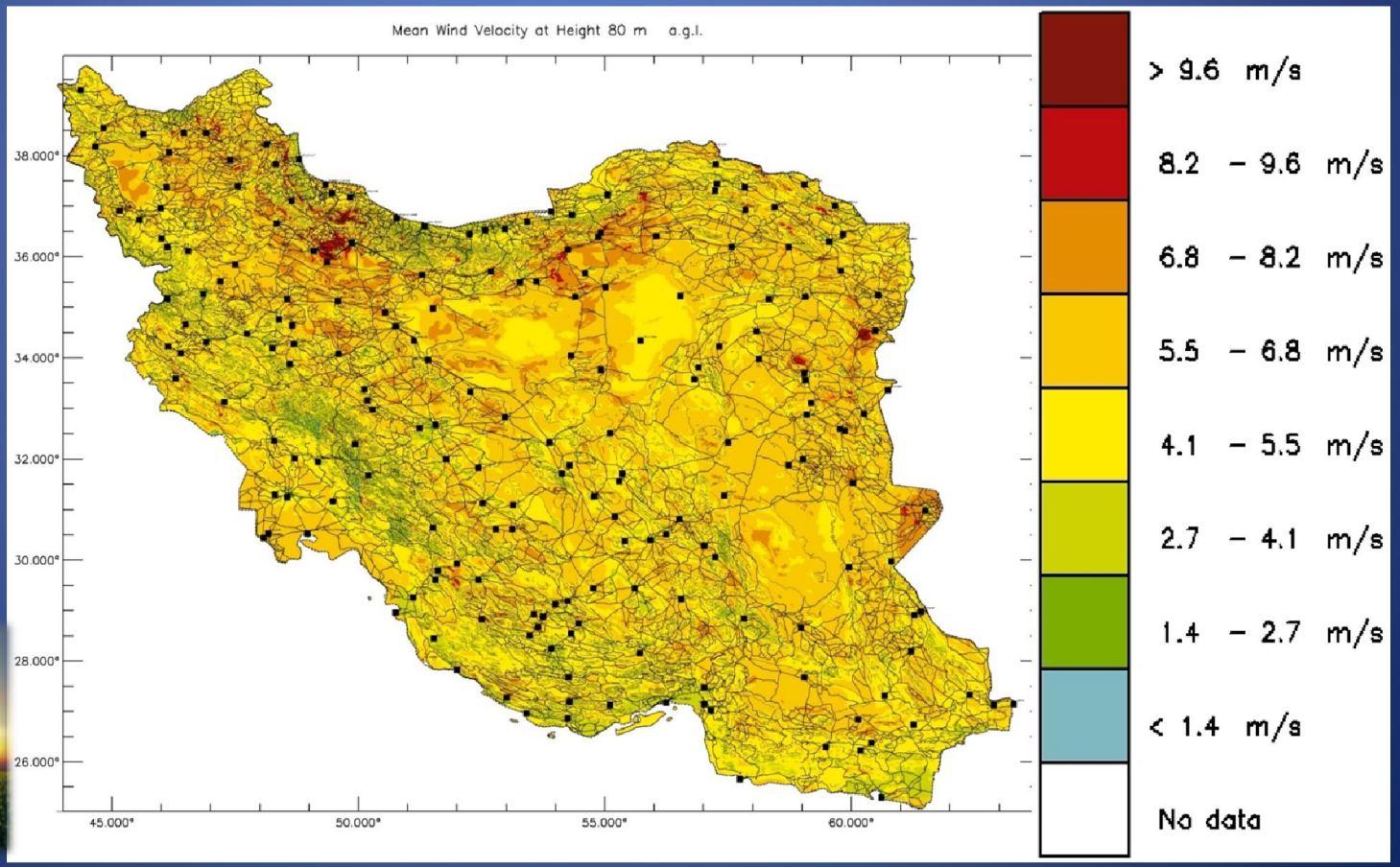


پتانسیل انرژی زیست توده

پتانسیلهای انرژی بادی، خورشیدی، زمین‌گرمایی و زیست‌توده

هم اکنون بیش از ۱۵۰۰۰ MW پتانسیل اقتصادی و بیش از ۴۰۰۰۰ MW پتانسیل فنی در کشور شناسایی شده است.

سرعت باد در ارتفاع ۸۰ متری



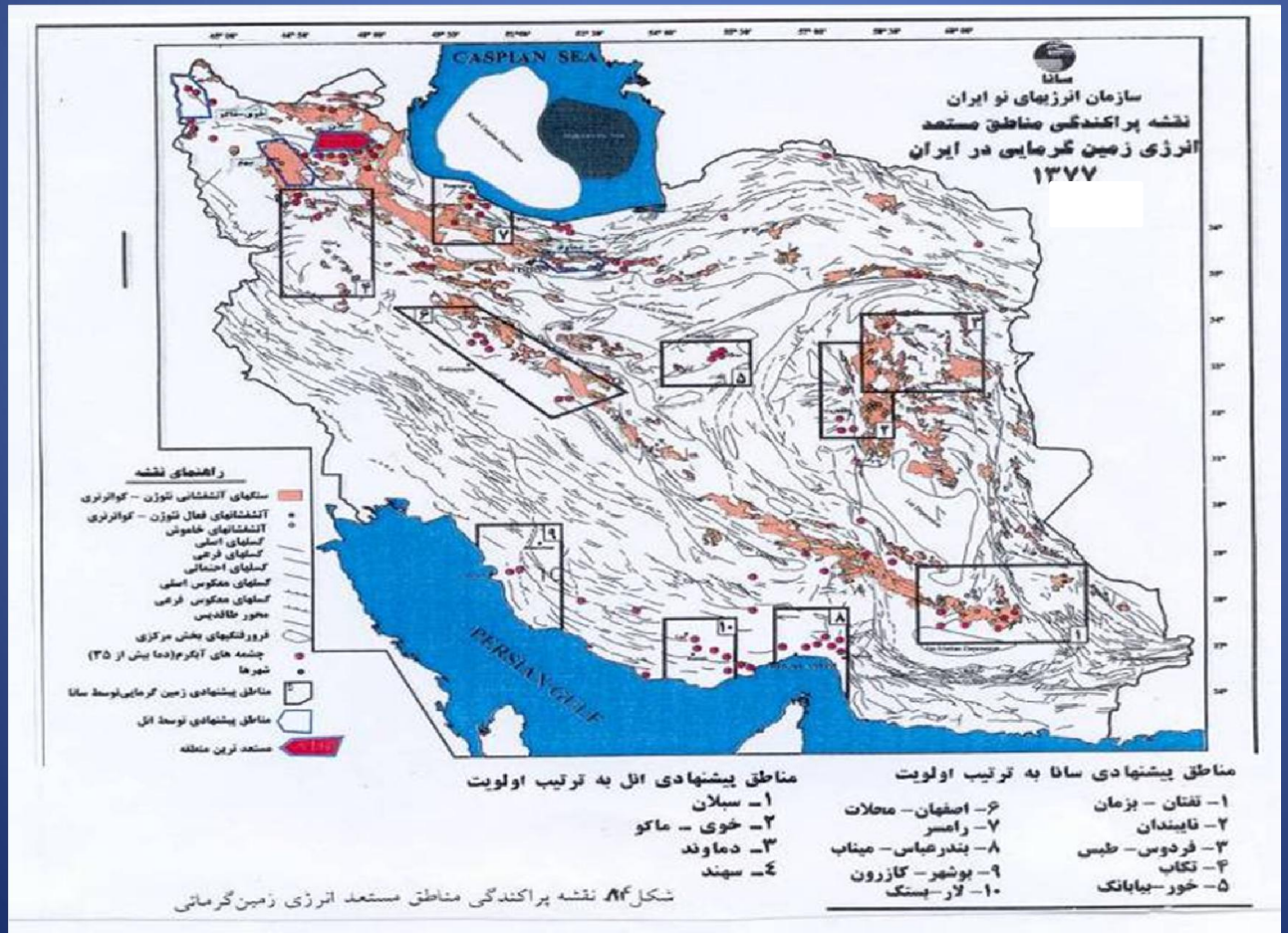
پتانسیلهای انرژی بادی، خورشیدی، زمین‌گرمایی و زیست‌توده

با مطالعات انجام شده توسط DLR آلمان، در مساحتی بیش از ۲۰۰۰ کیلومترمربع، امکان نصب بیش از MW ۶۰۰۰۰ نیروگاه حرارتی خورشیدی وجود دارد.

اگر مساحتی معادل ۱۰۰*۱۰۰ کیلومترمربع زمین را به ساخت نیروگاه خورشیدی فتوولتائیک اختصاص دهیم، برق تولیدی آن معادل کل تولید برق کشور در سال ۱۳۸۹ خواهد بود.

پتانسیلهای انرژی بادی، خورشیدی، زمین‌گرمایی و زیست‌توده

ایران دارای ۱۵ منطقه مستعد زمین گرمائی است که فقط در یکی از این مناطق که در مشکین شهر می باشد. بر اساس مطالعات اکتشافی انجام شده، ظرفیت مخزن در حدود ۲۵۰ مگاوات الکتریکی و ۱۲۵۰ مگاوات حرارتی تخمین زده میشود.



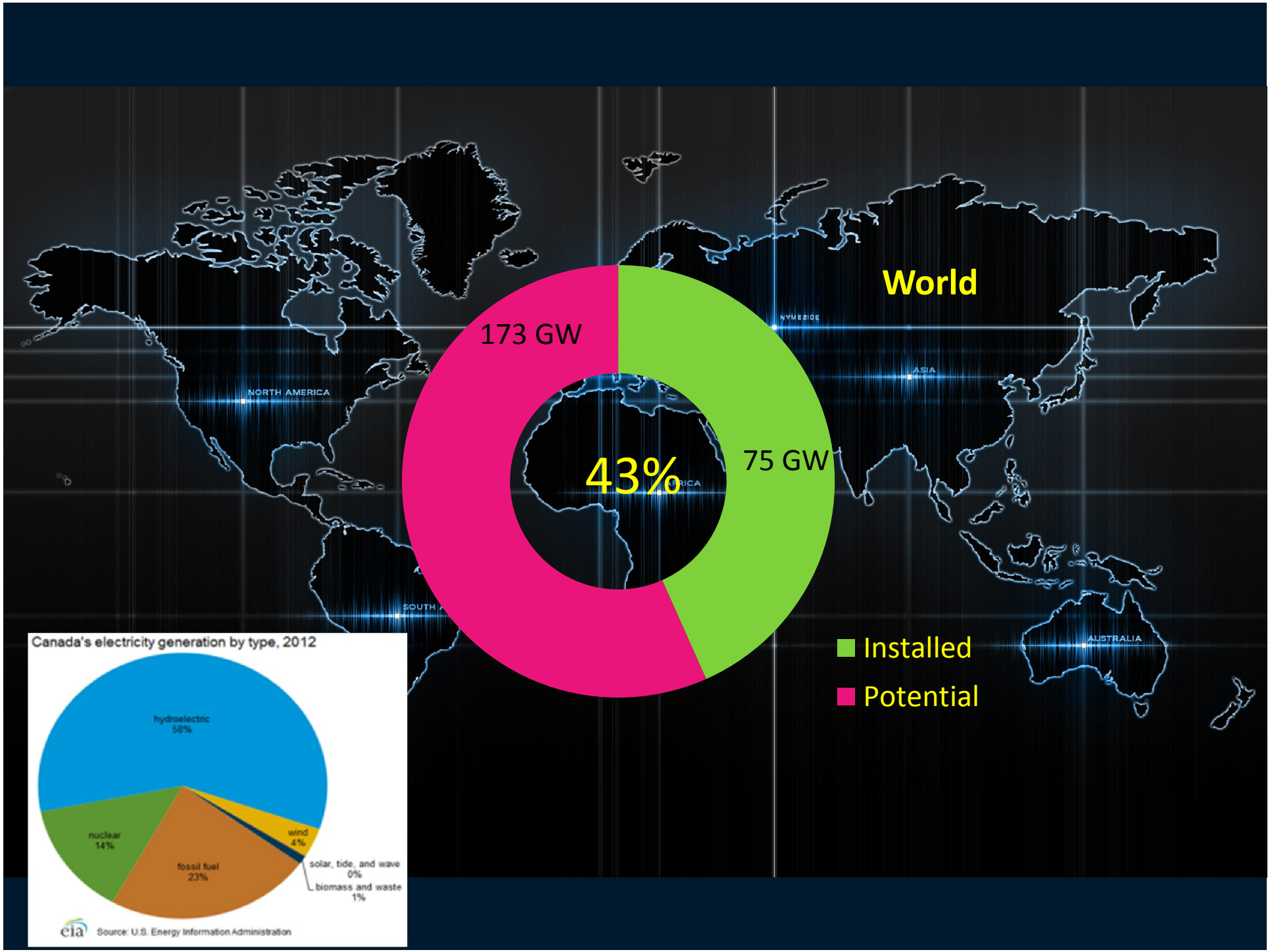
شکل ۸۴ نقشه پراکندگی مناطق مستعد انرژی زمین‌گرمائی

پتانسیلهای انرژی بادی، خورشیدی، زمین‌گرمایی و زیست‌توده

پتانسیل حداکثر تولید برق از انواع نیروگاههای زیست توده در سال ۸۶ برای شهرهای بالاتر از ۲۵۰ هزار نفر (۳۰ شهر) بالغ بر ۸۰۰ مگاوات به تفکیک ۳۱۱ مگاوات نیروگاه زباله سوز، ۲۱۷ مگاوات نیروگاه پیرولیز-گازی سازی، ۱۵۹ مگاوات نیروگاه هضم بیهوازی و ۱۱۲ مگاوات نیروگاه لندفیل بوده است.

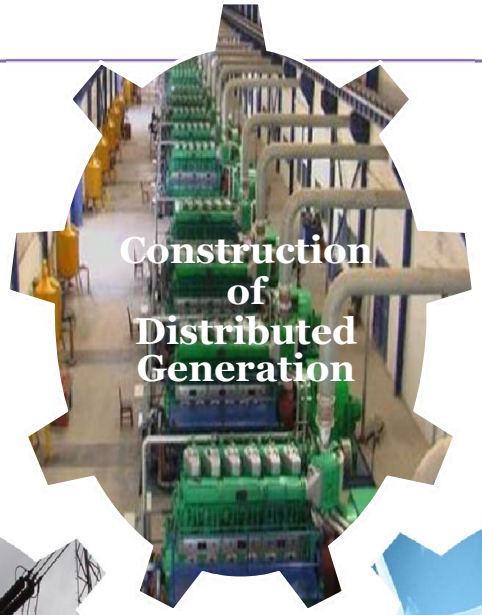
نام شهر	Pinc (MW)	Ppg (MW)	Pad (MW)	Pslf (Mw)
آبادان	۲/۱۲	۱/۵۳	۱/۰۳	۰/۷۲
اراک	۳/۹۱	۱/۹۵	۳/۴۴	۲/۴۳
اردبیل	۵/۹۵	۴/۴۸	۲/۴۲	۱/۷۱
ارومیه	۶/۵۰	۴/۰۳	۴/۰۶	۲/۸۶
اسلامشهر	۳/۶۴	۲/۰۸	۲/۷۴	۱/۹۳
اصفهان	۲۱/۱۶	۱۶/۰۲	۹/۰۶	۶/۳۹
اهواز	۱۳/۰۰	۶/۹۰	۸/۹۹	۶/۳۴
بروجرد	۱/۲۳	۰/۶۸	۰/۹۴	۰/۶۶
بندرعباس	۳/۶۲	۲/۰۲	۲/۶۸	۱/۸۹
تبریز	۱۵/۱۱	۹/۸۵	۸/۸۳	۶/۲۲
تهران	۱۱۰/۸۰	۸۰/۲۷	۵۱/۰۴	۳۵/۹۹
خرم آباد	۳/۸۹	۲/۳۱	۲/۷۳	۱/۹۳
دزفول	۲/۳۰	۱/۵۹	۱/۰۷	۰/۷۵
رشت	۷/۴۲	۵/۷۰	۲/۷۹	۱/۹۷
زاهدان	۳/۸۱	۳/۱۵	۱/۰۰	۰/۷۱
زنجان	۳/۴۱	۲/۱۹	۲/۱۲	۱/۴۹
ساری	۳/۰۵	۱/۷۳	۲/۲۶	۱/۵۹
سنندج	۳/۲۰	۲/۳۳	۱/۴۹	۱/۰۵
شهرقدس	۲/۰۹	۱/۱۹	۱/۵۷	۱/۱۱
شیراز	۱۷/۲۹	۱۳/۷۲	۵/۹۸	۴/۲۲
قزوین	۵/۱۱	۳/۵۸	۲/۶۳	۱/۸۵
قم	۱۰/۶۴	۸/۲۲	۴/۲۱	۲/۹۷
کاشان	۲/۹۲	۲/۰۵	۱/۵۲	۱/۰۷
کرج	۱۷/۷۸	۱۲/۵۸	۹/۰۷	۶/۴۰
کرمان	۳/۸۵	۲/۱۴	۲/۴۶	۱/۷۳
کرمانشاه	۲/۲۵	۲/۰۹	۰/۳۰	۰/۲۱
گرگان	۴/۲۲	۳/۴۵	۱/۲۶	۰/۸۹
مشهد	۲۲/۶۰	۱۴/۴۳	۱۴/۲۶	۱۰/۰۵
همدان	۶/۵۶	۳/۲۱	۵/۴۷	۳/۸۶
یزد	۲/۹۸	۱/۶۶	۱/۹۰	۱/۳۴
مجموع	۳۱۱/۲۸	۲۱۷/۱۵	۱۵۹/۳۱	۱۱۲/۳۴

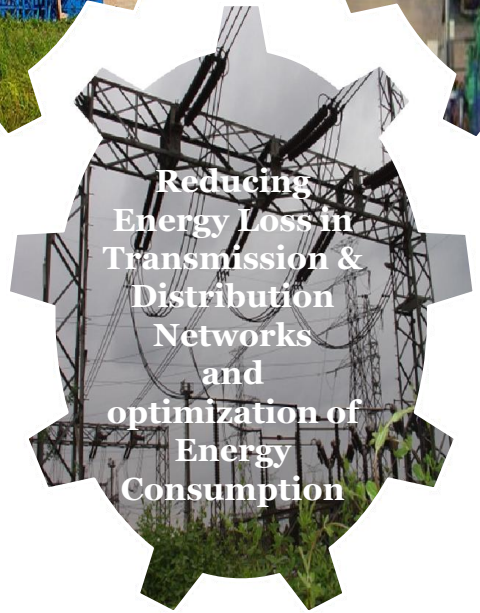
راهنما:
(Pinc) حداکثر توان تولید برق نیروگاه زباله سوز از "پسماند ورودی به محل دفن" بر حسب مگاوات
(Ppg) حداکثر توان تولید برق نیروگاه پیرولیز-گازی سازی از "پسماند ورودی به محل دفن" بر حسب مگاوات
(Pad) حداکثر توان تولید برق نیروگاه هضم بی هوازی از "پسماند ورودی به محل دفن" بر حسب مگاوات
(Pslf) حداکثر توان تولید برق نیروگاه لندفیل مهندسی از "پسماند ورودی به محل دفن" بر حسب مگاوات


World
173 GW
75 GW
43%
Installed
Potential
NORTH AMERICA
ASIA
AUSTRALIA

Canada's electricity generation by type, 2012
hydroelectric 58%
nuclear 14%
fossil fuel 23%
wind 4%
solar, tide, and wave 0%
biomass and waste 1%
eia
Source: U.S. Energy Information Administration

Investment Opportunities and Incentives in Power Industry





Incentives for The Construction of Combined Cycle (F & H Class)

- B.O.O Contracts
- Five-year Energy Conversion Agreement (ECA)
- Guaranteed Supply of fuel for the plants
- Base Price for the purchase of electricity :2.6 $ cent/KWH
- Proportional Balance of Inflation and Exchange Rate
- To Facilitate the obtainment of licenses(environment,……)
- The permission of electricity export after the ECA contract
- Guaranteed payment by government

Other Projects for investment in Power Sector

- To increase the efficiency of Gas Turbine Power plants
- To increase the efficiency of Steam Turbine Power plant
- Construction of Renewable energy power plants
- Reducing Energy Loss in Transmission & Distribution Networks and optimization of Energy Consumption

Investment Incentives in Power Plant projects- Legal Article 12

- **The possibility of contracts with local and foreign private investors for the purchase of products in which payback, main capital and profit by government will be covered**
- **The permission of export and selling to foreign and local sectors**
- **The supply of saved fuel and the on-hand permission**
- **Payment based on the average local and export price**
- **The supply of crude oil on export gates equal to the saved gas-fuel**

To increase the efficiency of Gas Turbine Power plants & Steam Turbine Power plant

The save-energy will be handed to the investor based on the average local and export price

Reducing Energy Loss in Transmission & Distribution Networks and optimization of energy consumption

- **Reducing Energy Loss**
- **To increase efficiency**
- **To supply electricity via reducing energy loss instead of Developing Supply Side**

Incentives for Reducing the Energy Loss

- Payment based on the average local and export price
- The permission to export of electricity saved (reducing energy loss)
- Possibility of trading electricity via transit network
- The supply of crude oil on export gates equal to the saved gas-fuel

Renewable Power Plants (Wind, Solar, Biomass and Small Scale Hydroelectric)

- Expanding the capacity of renewable power plants by 5000 Megawatts by 5 years
- Highly potential sites with 60 percent production rate
- More than 300 days sunshine
- High potential of urban waste
- small hydroelectric power plants mostly alongside the water transfer lines and water flow of rivers

Water and Wastewater Sector

Water and Wastewater Projects (Pipe Lines, Collection and Treatment of Wastewater and Desalination Plants)

The schemes for investment by private sectors in wastewater projects are as follows:

- ❑ **B.O.O**
- ❑ **B.O.T**
- ❑ **Buyback**

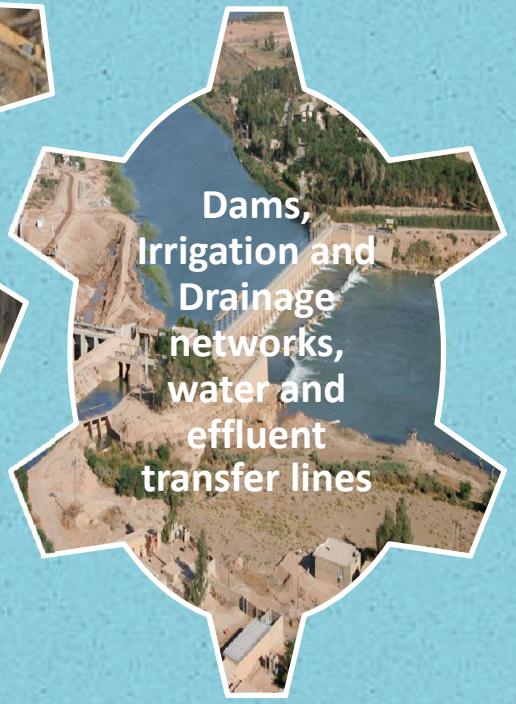
In B.O.O and B.O.T :

- **52 desalination projects: Nominal capacity : 291000 cm/24h**
- **One heavy metal elimination project: Nominal capacity : 9000 cm/24h**
- **9 wastewater treatment plants : Nominal capacity : 191000 cm/24h**
- **3 water treatment plants : Nominal capacity : 632000 cm/24h**
- **4 water transfer projects: 106000 cm/24h**
- **One water loss reduction project : 983 cm/24h**

In Buyback scheme:

- **13 waste collection and treatment projects with 500 million dollars.**

Opportunities and Incentives for Investors in Water and Wastewater Industry



Dams, Irrigation and Drainage networks, water and effluent transfer lines

In this section, 12 projects are ready to attract the investment of private sectors.
There is also the possibility of Public Private Partnership (PPP) for investments in 30 other project plans.

Projects	Type of Partnership	Number of Projects for Investment
Irrigation and Drainage networks	Non-governmental	3
Dam	Non-governmental	5
Water and effluent transfer line	Non-governmental	3
Management of surface water	Non-governmental	1
Non-governmental		**12**
Irrigation and Drainage networks	Public Private Partnership	18
Power plant	Public Private Partnership	10

Dams, Irrigation and Drainage Networks, Water and Effluent Transfer Lines

Incentives for Investment:

- **Contract for guaranteed treated water purchase or guaranteed purchase for the services**
- **National land lease to the investor within the framework of incentive packages to increase the capital interest and to shorten the period of capital return.**
- **Ownership of the lands in the project site**
- **Issuance of water documents for surplus water on water share**
- **Issuance of permissions to sell water or to commission water to consumption targets**

Investment Opportunities in Wastewater transmission lines

Investment in wastewater transmission lines

Investor’s capital (Dollars)		8195
Annual output capacity (Million cubic meter)		18
Maximum Period (Year)	Construction period	2
	Commercial operation period	19
Internal rate of return (IRR) (%)		10

Collection and treatment of water and wastewater , water waste reduction and smart water network Projects

Water transfer, desalination plants, smart water counters, Water waste reduction, Wastewater treatment plants projects are new potentials for investment by private sectors. Mostly the contracts are BOT, BOO and buyback.

Collection and treatment of water and wastewater , water waste reduction and smart water network Projects

Incentive for Investment:

- Guaranteed treated water and treated waste purchase
- Purchase of surplus water on saved water share
- Pay for water transfer services
- The possibility of commissioning treated water and effluent for a fixed period

Investment Opportunities in water and wastewater sector

Item	Description	No. of projects	Type of investment	Investment amount	
				IRR (IRR billion)	Currency (USD million)
1	Wastewater treatment plants (Rural, small communities and residential complexes)	70 villages	BOT	4500	140
2	Consumption management and installation of intelligent meters	3 million meters	ROT	9000	281
3	Implementation of water supply plans	2 plans	Finance / BOT	1300	40
4	Construction of desalination systems	4 plans	BOO	2650	83
4-1	Master Plan for production and transmission of desalinated water in the south	2 master plans	BOO	108000	3600
5	Implementation of NRW projects in a number of cities	35 plans	BOT / ROT	6400	200
6	Sludge management and construction of WWTP in large cities	4 WWTP	BOT	6500	204
7	Completion of wastewater systems against allocation of effluents in the frame of buyback contracts	17 plans	Buyback	23120	770
8	Construction of small scale treatment plants in the administration buildings of the	100 units	Purchase	5500	180

Investment Potentials in water transmission lines in contract form of BOT

Investment in water pipe line in contract form of BOT

Capacity (Million cubic meter per year)	17.66
Investment cost (thousand dollars)	9580
Construction period (Year)	1
Operation period (Year)	25
Internal rate of return (IRR)	12
Payback period (Year)	9


Thank You for Your Attention