



TURKISH COAL MINING SECTOR

Current State, Strategy for the Future

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UNECE EG CMM, GMI & MENR
Workshop on Best Practices
in Coal Mine Methane Capture and Utilisation
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OUTLINE

- Overview of Turkish Mining Sector
- Turkish Coal Mining Sector
 - Key Drivers of Coal Policy of Turkey
 - Coal in Domestic Energy Production
 - Coal Basins and Resources
 - Coal Producers & Production
 - Role of Coal in Turkey's Energy Mix
 - Role of Coal in Turkey's Electricity Generation
 - Future strategies & Planned Main Coal –Based Capacity
- Short Introduction of TKI

Overview of Mining Sector in Turkey

- Turkey produces more than 50 mineral commodities
- **Major minerals** : Coal, boron, chromium, copper, iron, gold, marble, bentonite, feldspar, trona (Turkey owns 72% of the World's boron reserves)
- **Trade**
- Mineral export share in total (2018): 2.7% (İMİB)
Natural stone highest share
- Mineral import share in total: 3%
Hard Coal import :4.4 Billion \$
(highest value in total mineral import: 6.8 Billion \$)
- **Size of mining**
 - Number of mining companies (2017): 6219- (Coal: 436)
(State: 53; Private: 6166)
 - Number of Workforce: 130 ,523 **(Coal: 37596)**
(State: 12600; Private: 117,923)



Current State of Turkish Coal Mining Sector

- Key Drivers of Coal Policy :

- **ENERGY SECURITY**-Growing energy demand & High dependency on foreign energy resources
- **ENVIRONMENT**- Commitments for efficient use of coal to protect environment & combat climate change
- **RTD** -High dependency on technology
- **PRODUCTIVITY & VALUE ADDED**-Requirement to increase productivity and value-added by high efficient technologies & Establishing transparent and competitive market through privatization
- **SAFETY**- Requirement to improve work health and safety

Current State of Turkish Coal Mining Sector

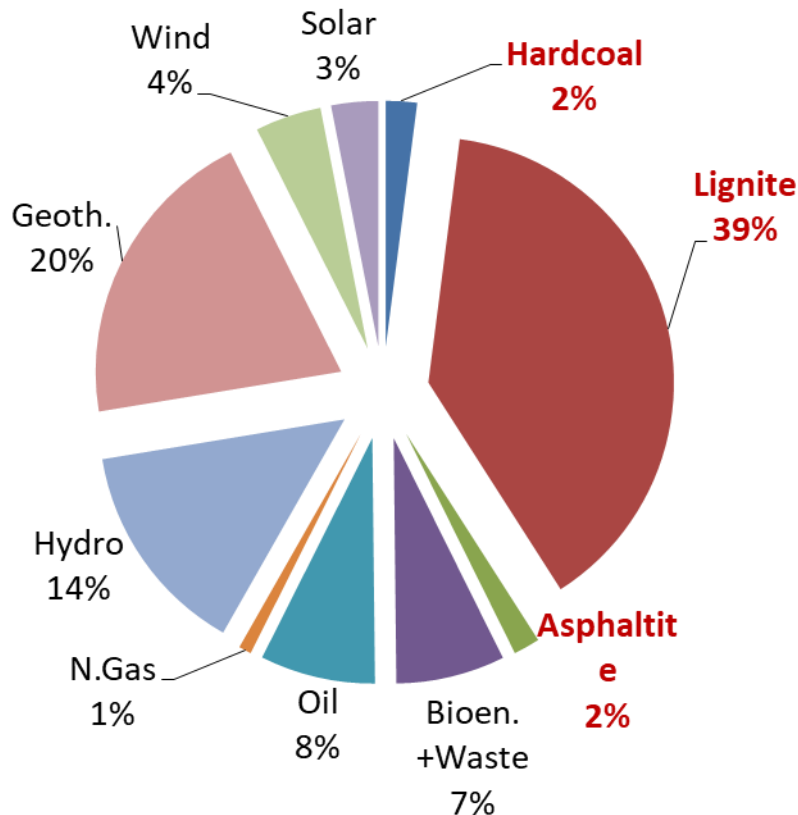
- ENERGY SECURITY- Objectives

Domestic Energy Production (2017) : 35.4 Mtoe



Foces to increase use of **domestic resources** by using clean energy tech.

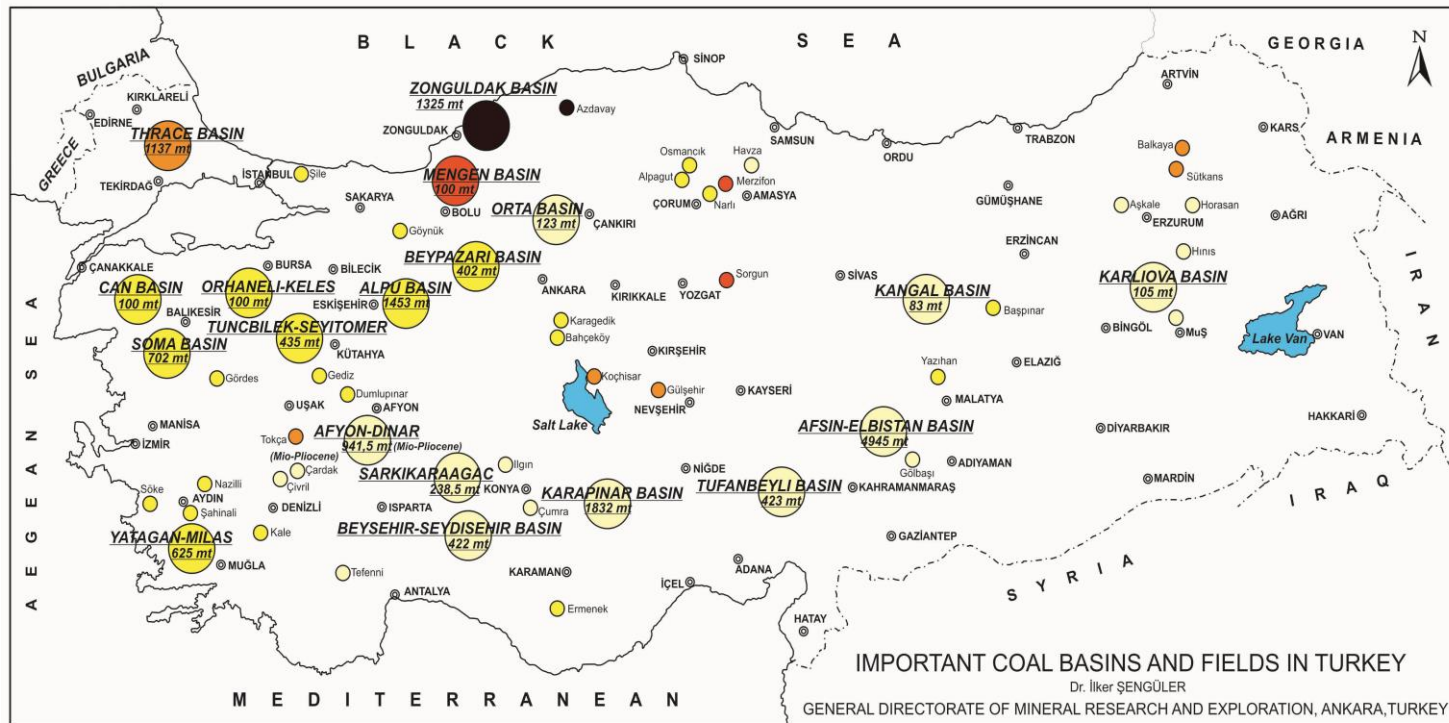
- To increase coal exploration studies
- **To incese coal production**
- **To increase productivity & efficiency**
- To acceralate deployment new cleaner domestic lignite-based power plants by selecting high efficient technologies
- improve incentives for lignite-based PP.
- To maintain the momentum at RTD studies on Clean Coal Technologies **(to promote domestic techn. development)**



Total Coal Share: 43%

COAL BASINS of TURKEY

Coal Reserve Increase (2005-2018) in Turkey



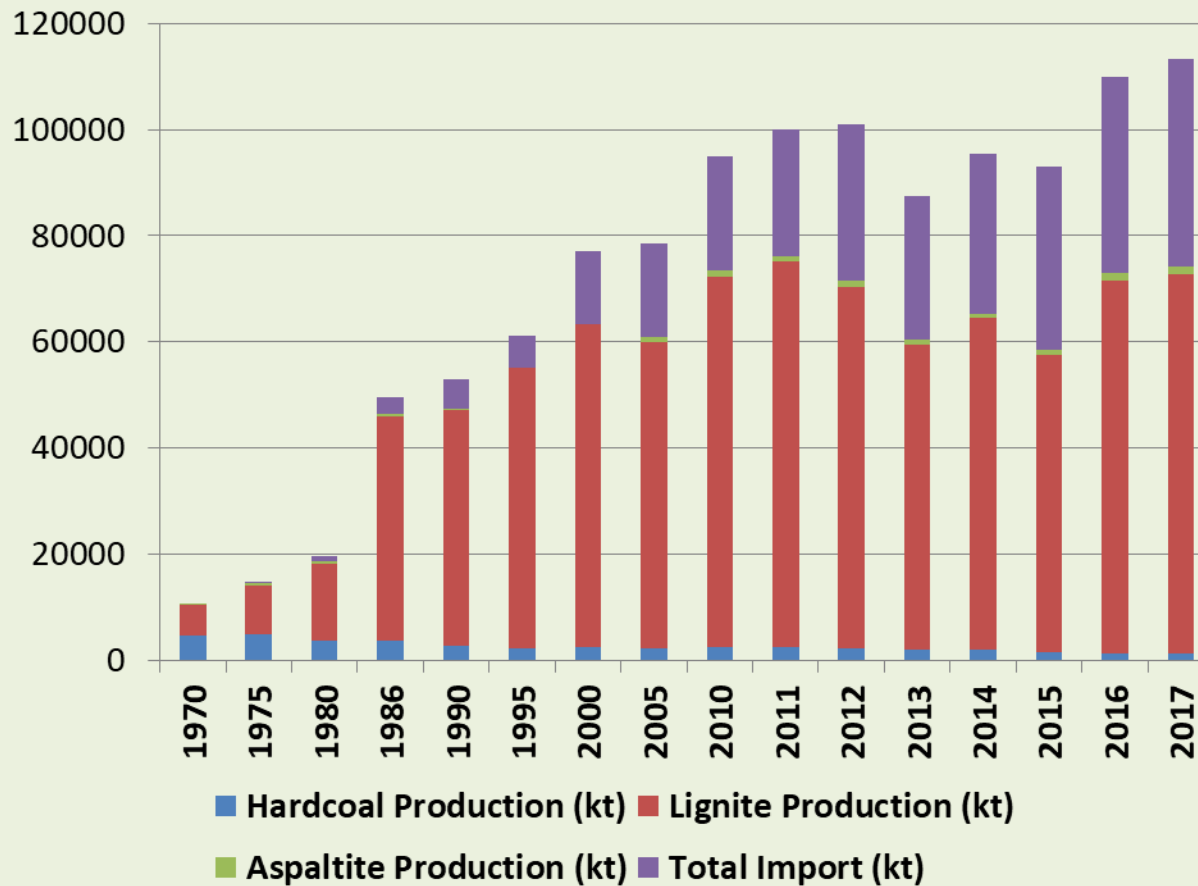
EXPLANATION	
	More than 80 Million tons reserve
	Less than 80 Million tons reserve
	Pliocene lignites
	Miocene lignites
	Oligocene lignites
	Eocene lignites
	Carboniferous hard coal
	Coal basin/field and reserve

Şengüler, İ. et. al., 2015, MTA

Lignite Reserves: 17,46 Billion ton (about 9 Bt reserve increase 2005-2018)
Hardcoal reserves: 1.3 Billion ton (512 Mt proved)

COAL POLICY- ENERGY SECURITY

- Production, Import (1970-2017)



In 2018

- 20% increase in TKI's coal production (30 Mt)

Turkey:

- **3rd biggest Lignite producer country**
- **8th biggest coal importer country**

(Ref: IEA Coal Information)

COAL POLICY- Privatization

- Change in Owner of Production (2011-2017)

		Run of mine- Million ton.			
	Producer	2011	%	2017	%
Lignite	TKİ	41,5	50	23,3	28
	EUAS	31,5	38	15,2	18
	Other			0,1	0
	State total	73	89	38,5	46
	Private Sector	9,4	11	45,7	54
	Total	82,4	100	84,2	100
Hardcoal	TTK + contractors	3,6			
Asphaltite		0,97		1,4	
TOTAL		86,97		85,6	

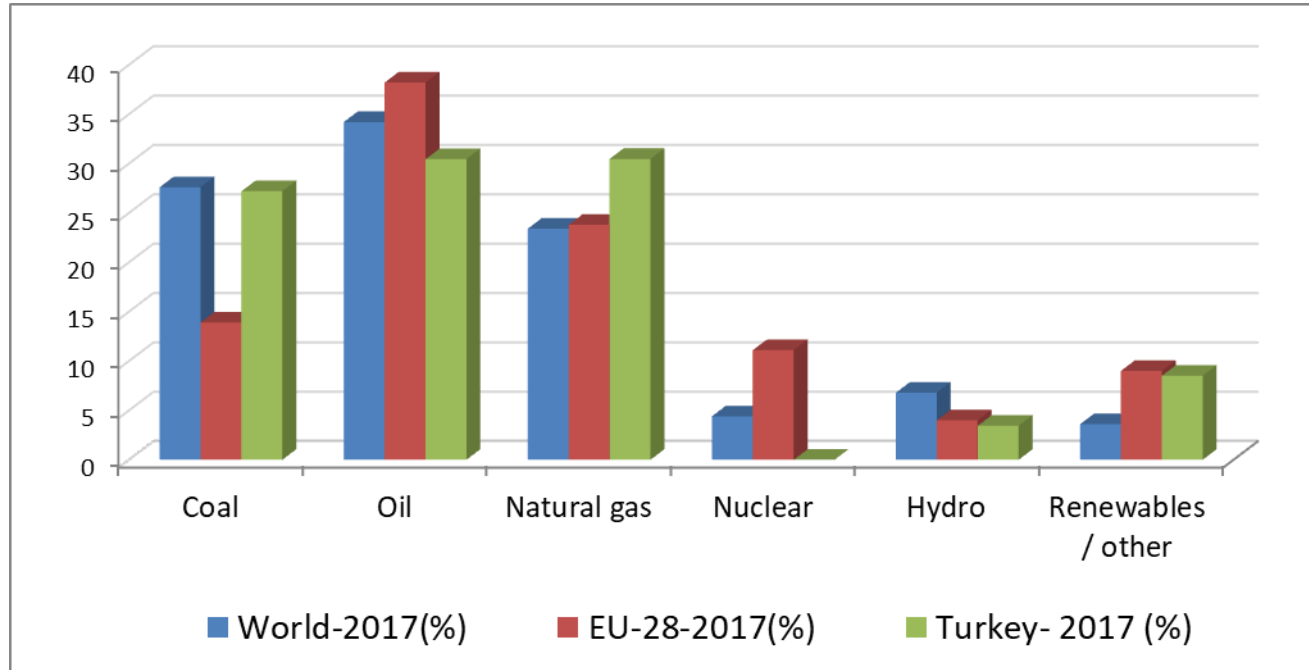
- Target is to increase productivity and value-added by high efficient technologies
- Establishing transparent and competitive market through privatization

Source: MAPEG

Role of Coal

- Comparision with EU and World Average (2017)

Coal Share in Energy Mix

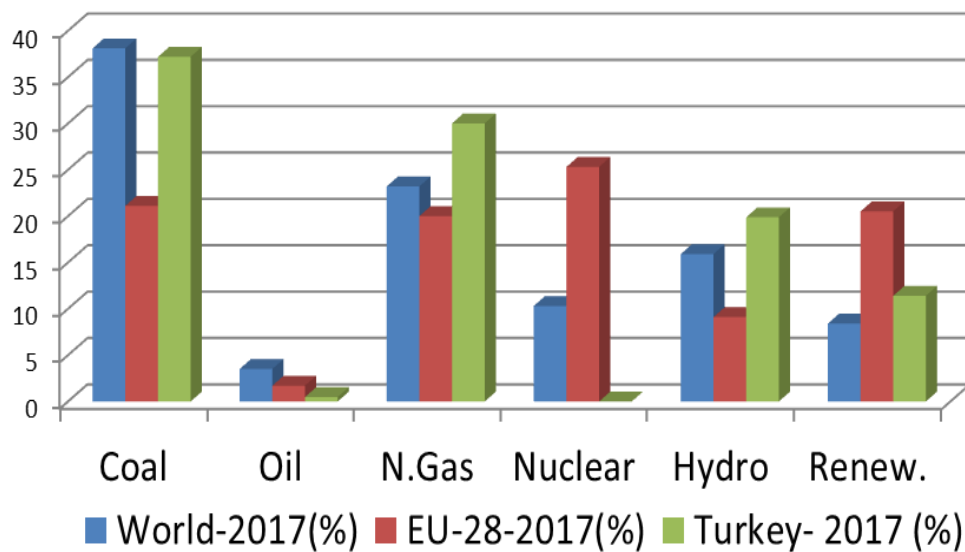


World: BP Statistical Review of World Energy 2018, Turkey: 2017 Energy Balance Table of MENR

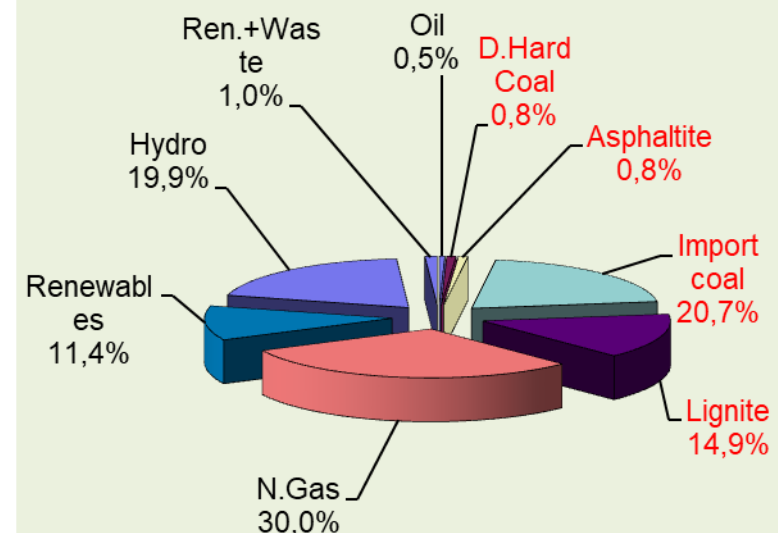
Role of Coal

- Comparision with EU and World Average (2017)

Coal Share in Electricity Generation, 2017



Electricity Generation, Turkey, 2018



Total Coal share: 37,2%

World: BP Statistical Review of World Energy 2018, Turkey: 2017 TEIAS data

TURKISH COAL ENTERPRISES

TKI (State Economic Enterprise)
major lignite producer in Turkey since 1957

By the end of 2018:

Reserve amount: 2,13 Bt
(23% of Total Lignite Reserves)

Production(r.o.m): 30 Mt

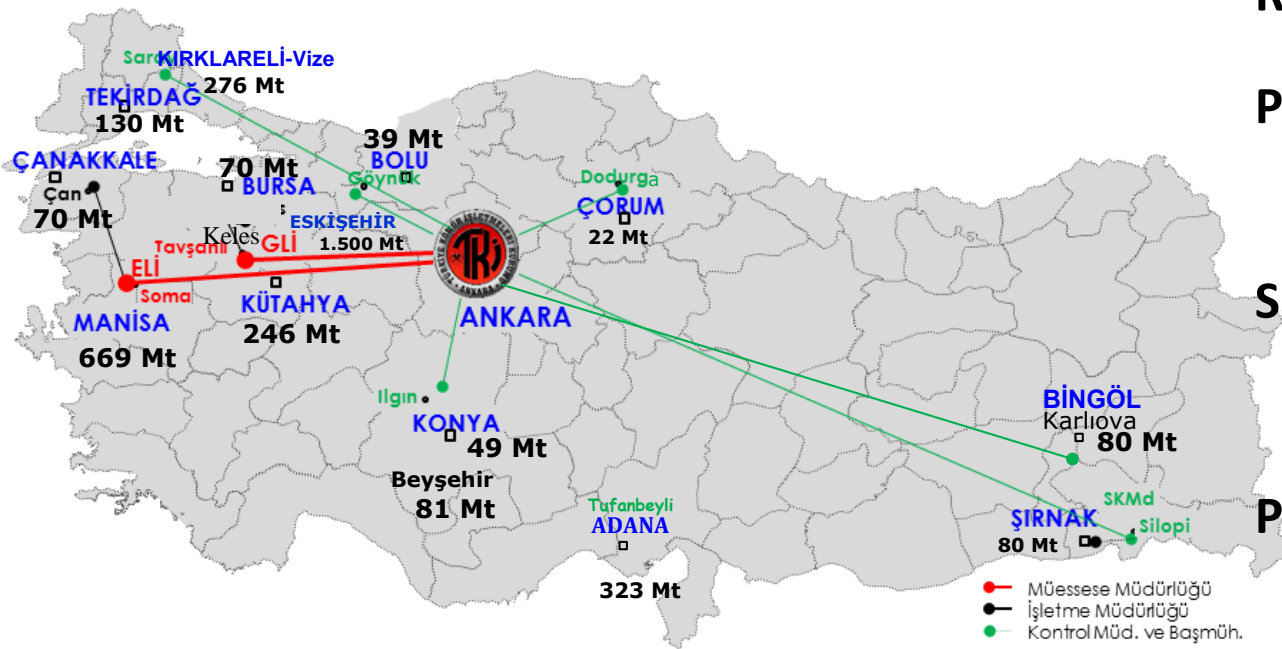
Open Pit: 16 Mt
Underground: 14 Mt

Sales: 20 Mt

Power Plants: 12.6 Mt
Industry+Household :7.4 Mt

Personnel: 17313

TKI: 4,386
Contractor: 12,927



LEADING ROLE in initiating, supporting, development of **RTD Projects on COAL**

TKI has a wide international network to collaborate with coal-related research institutes, organisations, boards, universities, companies:

- Membership to IEA-CIAB, EURACOAL, Vice-Chair at Bureau of UNECE CEP

Current State of Turkish Coal Mining Sector

- TKİ and Its Contractors' Main Underground Mines

Tuncbilek Region:



Ömerler U/G Mine (GLİ)

Producer: TKİ (State)

Production Cap: 1 Mt

Workforce: 600

Mining Method: Longwall

Gas Content: low (ITU Report)

Soma Eynez Region



Soma Eynez

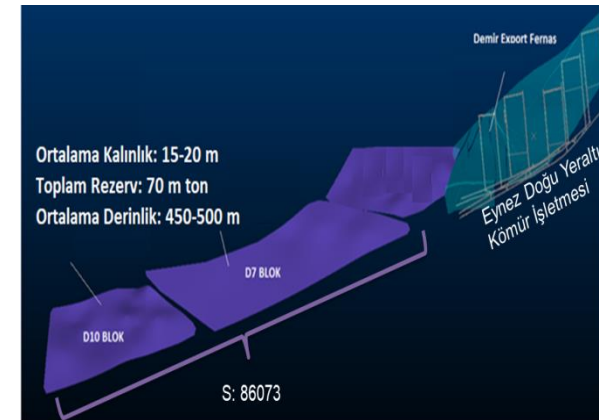
Producer(**IMBAT**- private
(contractor of TKİ)

Production Prog(2019): 6.8 Mt

Workforce: 5600

Methane Amount: 1 ton/m³
(ventilation air)

Mining Method: MSL Longwall



Soma Eynez East

Producer(**Demirexport-Fernas**
private -contractor of TKİ)

Production Cap: 4.2 Mt

Workforce: 1054

Methane Amount: 0.78 ton/m³
(ventilation air)

Mining Method: Longwall

R&D PROJECT - Underground coal & **CBM determination** by integrated (Reflection & WVSP) seismic in the miocene Soma Basin (Western Turkey)

PROJECT DURATION: 2009-2012

PROJECT PARTNERS: TUBITAK Geo-Science Institute (koordinator), TKI, TPAO, Universities

FUNDING: TUBITAK

PURPOSE: To develop Integrated Seismic method for estimating underground coal and investigating coal methane potential

PROJECT AREA: Soma Region

PROJECT RESULTS:

- Determination of gas content of coal samples by canister desorption test : low (only some of 23 drillings: 4 m³/ton)
- Bacterial origin of gas (geochemical analysis result)
- Integrated Seismic Method can be used for coal estimation (fast, cheap comparing to drillings)

COAL POLICY- Productivity Improvement Target

- TKI Productivity Project

Aim: is productivity measurement and improvement by effective usage of existing resources and innovative ways

By: R&D Department of TKI

Project Coordinator: (M.Ersoy)

Company-wide working group

In 2018

- Company –wide awerences conferances
- **Trainings** on «productivity mesurement» and «work-study techniques including field applications»
- Determining **productivity indicators** for whole activities (indicators prepared),

In 2019

- Brain storming meeting on finalizing indicators 12 March 2019),
- Reporting and evalution last five years' indicators: measurement of productivity
- Establishing employee suggession sytem
- Designing and implementation of application provide productivity enhancement
- Establishing monitoring system



Coal Policy in TURKEY

- Efficient use of coal to protect Environment & Combat Climate Change –

CLEAN COAL TECHNOLOGIES

- Coal upgrading technologies -Increase in capacity of coal washing & enrichment of washing Plant's coal fines
- Involvement of RTD studies on CCT by coal producers's own budget, the support of national (TUBITAK) and EU (Framework Programmes) funding
 - to reduce also dependence on foreign imports of high technology.

RTD PROJECTS- Pilot -Scaled Coal Gasification Projects



250 t/h ENTRAINED BED GASIFIER, Tuncbilek, TKI, Turkey

Target: Methanol Production (including CO₂ capture)



1.1 MWth CBTL Plant, Soma, TKI, Turkey

Target: Liquid Production (including CO₂ capture)



**EU 7.FP Project-
1-MW_{th} CFB pilot plant,
THERMAX, Pune, India, Target: IGCC**

SOME ENVIRONMENTAL PROJECTS

TKI's Reclamation, Olive Oil Production, recycling of waste & u/g water

MUĞLA (YATAĞAN) AĞAÇLANDIRMA SAHASINDAKİ ÜRETİM FAALİYETLERİ



Kurumumuzun yapmış olduğu ağaçlandırma çalışmaları kapsamında dikimi yapılan zeytin ağaçlarından 2011 yılı itibarıyla 26 ton

Olive Oil Production at post mining area



By 2018: 8.5 Million plants (5133 ha)



Zero Waste Project

Recycling of Underground Water Project , TKI's Tuncbilek Mine (GLI)

Mücella Ersoy, CMM Workshop, 10 June 2019, Ankara

HIGH LEVEL STRATEGIES for FUTURE

- Energy Security

- Changes in fuel shares in electricity generation

ELECTRICITY MARKET and SECURITY of SUPPLY STRATEGY PAPER (2009)

- Targets for Electricity:
- Priority to usage domestic energy resources

→ To use **all** existing the domestic coal reserves by 2023 by using clean coal technologies

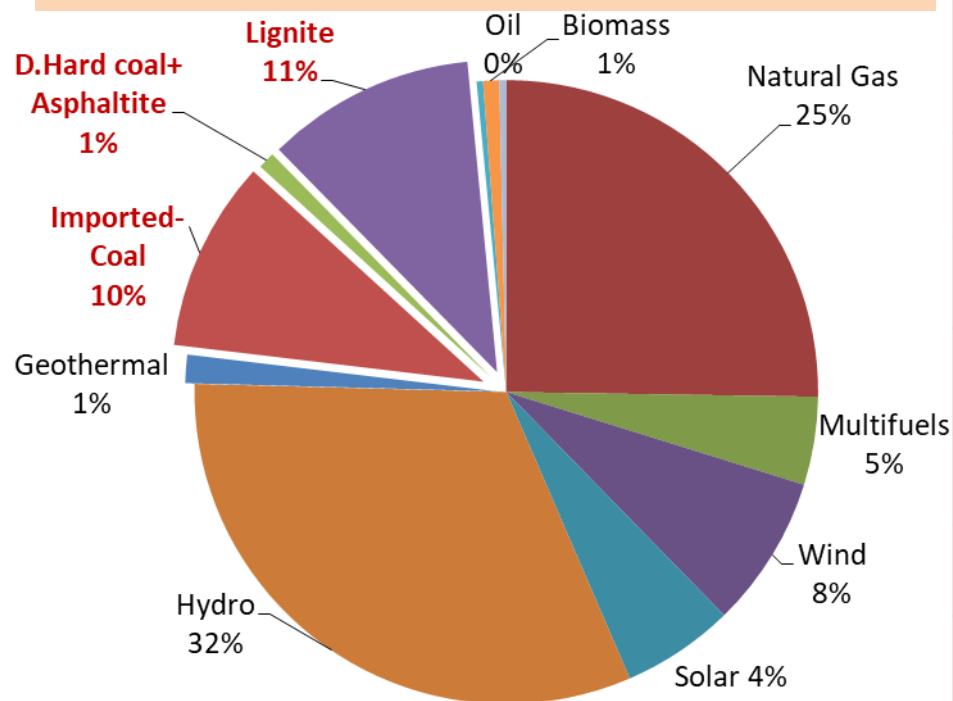
- To increase renewables share to **30%** by 2023
- To decrease n.gas share to **30%**.
- To add nuclear power with min. **5%**

	2009	2018
Fossil fuels share (%)	80.3	68.7
Renewables energy share(%) (including Hydro)	19.7	31.2

Turkish Coal Mining Sector: Strategies for the Future

- Existing and Planned Coal Capacity

2018 Tot. Installed Cap. by Fuel = 88,894 MW



Total Coal Cap.: 19,197,4 MW, 22%

Domestic Coal Cap.: 10,403,5 MW

(2680 MW TKI's coal)

Planned Coal Based Capacity by EUAS

Region	Reserve (Mt)	LCV (Kcal /kg)	Planned Cap. (MW)
Afşin-Elbistan C	1.344	1158	1800
KONYA-Karapınar	1.832	1374	~1000
ESKİŞEHİR-Alpu	568	2240	900-1100
AFYON-Dinar	941	1855	1000
ANKARA-Çayırhan	190	2617	800
TEKİRDAĞ-Malkara	617	2317	1000
Total/Avg	5492	1642	6700

Source: EUAS

Source: TEIAS

CONCLUSION

- Increasing of energy demand and dependency to foreign energy resources and technologies are the main issues of Turkey.
- Coal, particularly lignite & renewables are the the most important energy resource in Turkey to decrease energy dependence of Turkey
- Continue of usage of domestic coal, particularly for electricity generation requires promotion of more efficient, clean coal Technologies to comply with environmental legislation and climate change commitments.
- There is good progress on installing more efficient coal based power plants & improving environmental legislation & also renewables deployment in Turkey.
- More importance are given to RTD Projects on Clean Coal Technologies particularly pn lignite gasification in cooperation with national and international Research Institutions and Universities,



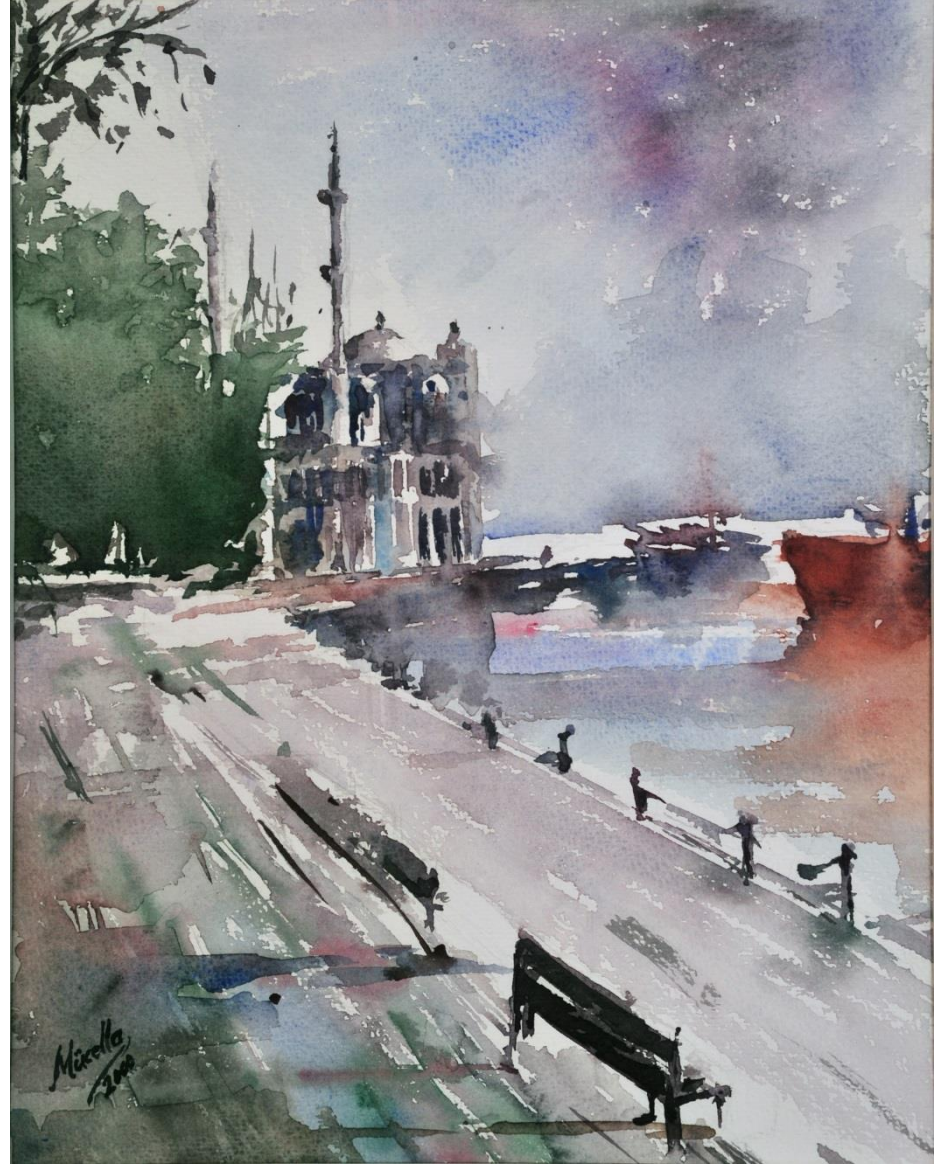
Thank you for your Attention

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