

POLICIES and IMPLEMENTATION FOR LOW CARBON TECHNOLOGIES IN AGRICULTURE

GENERAL DIRECTORATE OF AGRICULTURAL REFORM
(MoFAL/ GDAR)

Dr. Gürsel KÜSEK



INTRODUCTION

A new Climate Agreement for post 2020 is negotiated and hopefully, can be realized this year during COP-21 in Paris.

We hope that Turkey becomes a part of it.

The INDC (Intended Nationally Determined Contributions) of Turkey is getting prepared in these days and will be delivered before the Paris Conference.

As the Ministry of Food, Agriculture and Livestock we work under 3 main lanes;

- **Mitigation efforts under LULUCF**
- Adaptation
- Negotitions
- Capacity building

MITIGATION IN CROPLANDS

There are 6 land use categories in LULUCF. These are;

| Land Use | GHG Influence |
|--------------|---------------|
| • Forestland | REMOVALS + |
| • Cropland | REMOVALS + |
| • Grassland | REMOVALS + |
| • Settlement | EMISSIONS - |
| • Wetland | EMISSIONS - |
| • Other land | NO IMPACT |



The average contribution of total Croplands has been 1053.75 k t CO₂ eq/year of REMOVALS for the last 10 years,

The major contributions come from;

- Carbon stock increases in mineral soils due to good management practices
- Carbon stock increases in biomass of perennial croplands that include orchards, and other woody plants
- Decrease in biomass burning of crop residues

MITIGATION IN GRASSLANDS

Grasslands are important for Carbon removals in case of rangeland rehabilitation projects.

For the last 10 years the average area of range rehabilitation in Turkey by various government agencies has been between 5 000 to 17 000 ha/year. Every hectare of these rehabilitation projects provided carbon inputs to the soils around;

2.5 t C /ha yr in warm temperate moist

1.1 t C /ha yr in warm temperate dry

2.5 t C /ha yr in cold temperate moist

1.4 t C /ha yr in cold temperate dry



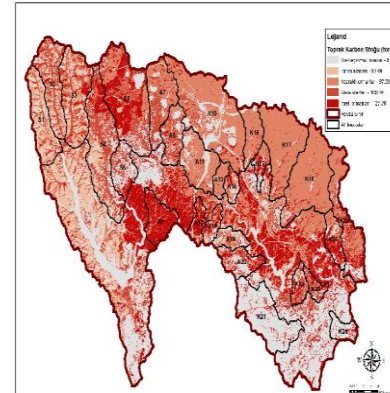
Regions of our country.

Land conversions between croplands and grasslands provide in an average of 1019.39 k t CO₂ eq /year removals (10 years average).

We perform GIS based studies to increase the accuracy of our GHG estimations.

For Settlements category;

Settlement areas in Alibeyköy, Sazlıdere, Kağıthane watersheds in Istanbul. Red areas are settlements.



Soil Carbon

Biomass Carbon

Total Carbon
Intensity



Capacity Building Activities

1- TRGM Climate Change Web page

<http://iklim.tarim.gov.tr/>

3- A software to be used to calculate Carbon emissions and removals from Farms.

<http://tikas.tarim.gov.tr:81/>

- Agriculture is a energy consumer, in the meantime is also energy producer.
- In 21. Century, 3 sector gain importance and being very strategic as Agriculture-Food, Water and Energy
- Agriculture is a sector that is able to produce clean and renewable energy.



- **Investment for infrastructure**
 - **Land Consolidation**
 - **National database of Water Resources, developing baseline to controlled irrigation system at national level**
 - **Integrated Agricultural Inventory System**
- **Financial Mechanisms to Support**
 - **Subsidies for low-carbon technology and machineries**
 - **Subsides to agricultural holding that use renewable energy**
 - **Supports for pipe Irrigation Systems**
 - **Stubble Management, supports for no-till and direct cultivation**
 - **Training of farmers on the awareness to increase soil organic matter, supports to good agricultural practices**
- **R&D Activities for biomass and agricultural residual management**
- **Energy Potential of Agriculture (Challenges and Opportunities)**

WAHT IS LAND CONSOLIDATION?

Before consolidation

After Consolidation

Irrigation lines

Irrigation investments %40 percent reduced ,

Irrigation rate is over %80 percent,

Production cost reduced about %35 percent.

5 Million hectare land was completed and 2.5 Million hectare land is under construction.

The infrastructures.

All development activities were completed with consolidation.

Center of Village

Terracing



parcels

Irrigation channel

Open derange channel



Roads



Roads



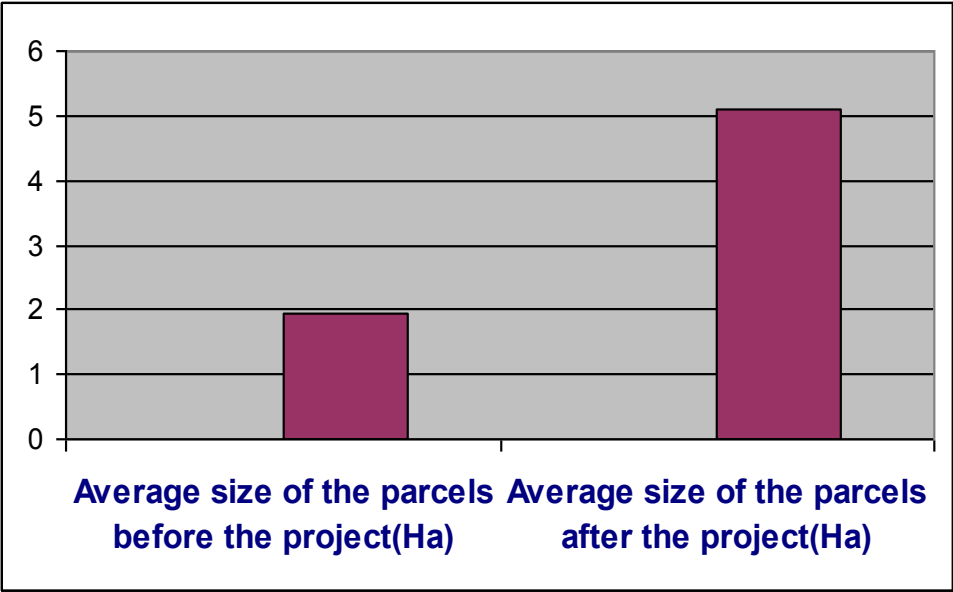
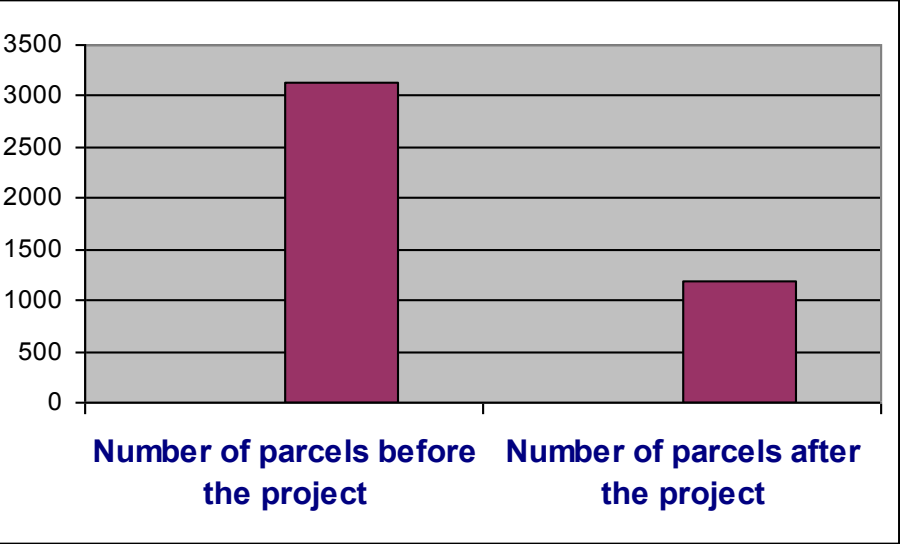
The new parcels

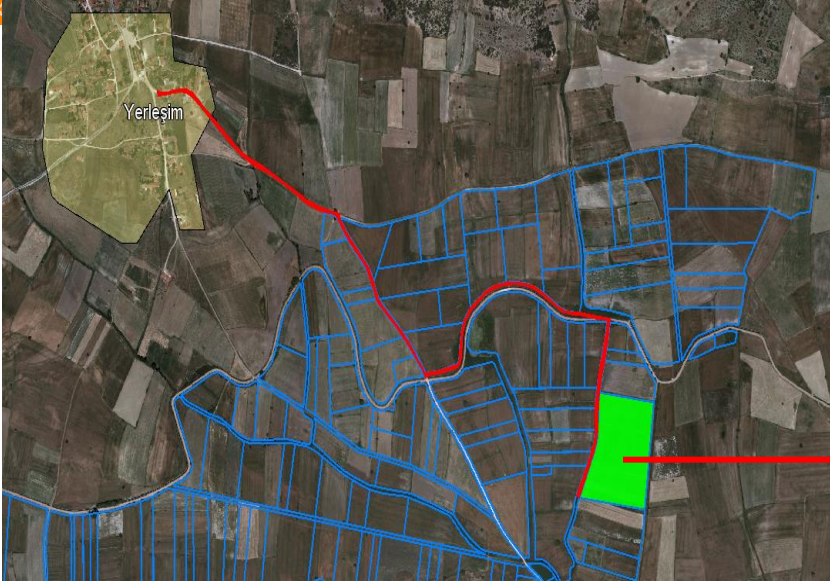
Rippering

The summary of the project area



| Number of village | Project area (ha) | Number of farmers | Population | Number of parcels before the project | Average size of the parcels before the project (Ha) | Number of parcels after the project | Average size of the parcels after the project (Ha) | Consolidation Rate |
|-------------------|-------------------|-------------------|------------|--------------------------------------|---|-------------------------------------|--|--------------------|
| 3 | 6,051 | 543 | 3309 | 3125 | 1.94 | 1188 | 5.10 | 62 |

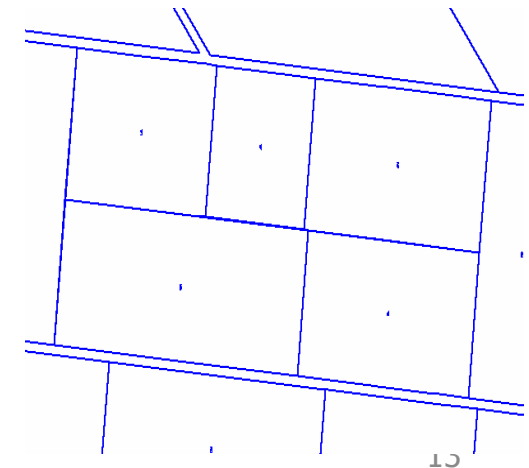
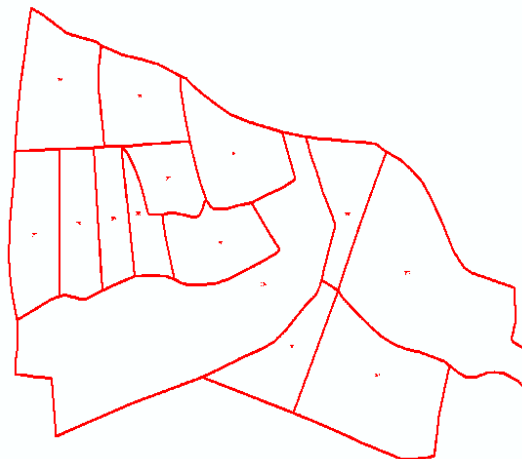




ENERGY SAVING



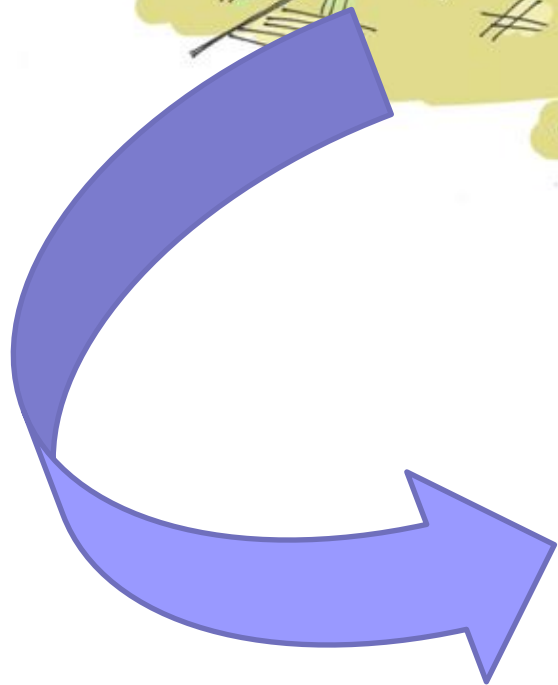
| | | |
|--|-----|---------------|
| Driving length in parcel | 25 | liter/hectare |
| Driving length from village center to parcel | 25 | liter/hectare |
| Total energy saving | 50 | liter/hectare |
| Percentage | %50 | |





Land Banking

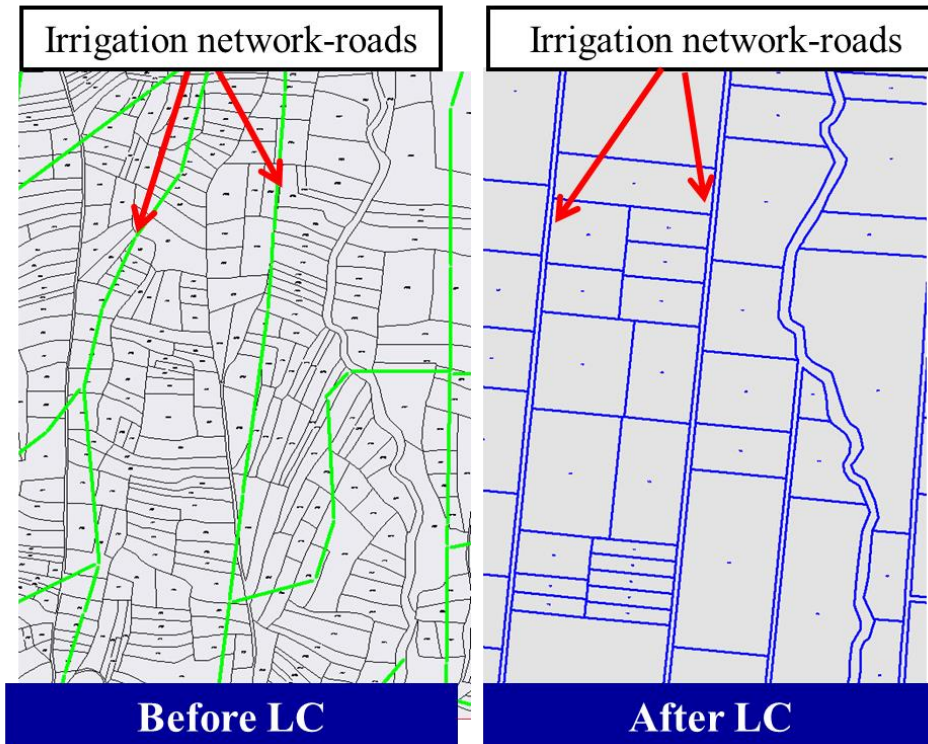
- Land Consolidation activities is not enough to solve the heritage problems.
- In order to solve those problems heritage law has been changed and Land Banking activities has been started.
- Especially small land owners agree to sell their land to their relatives,
- Subsidy is available for buyers,



➤ Land Consolidation

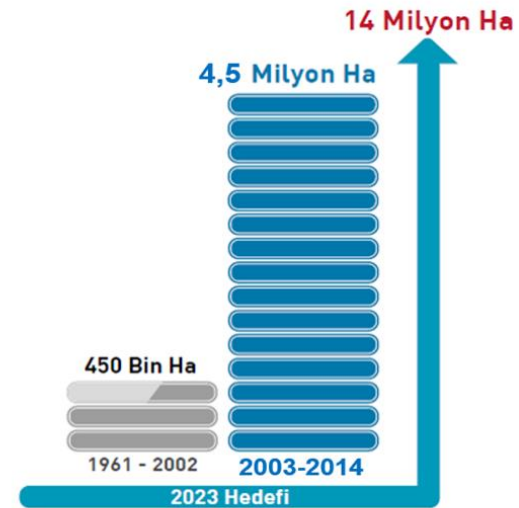
As an area of 5 million ha have been completed, 2 milyon ha are on-going.

Small, fragmented and scattered parcels are replanned for modern agriculture. (55 province - 235 district - 3960 willage)



1 million hectares land is being consolidated each year.

Land Consoludation

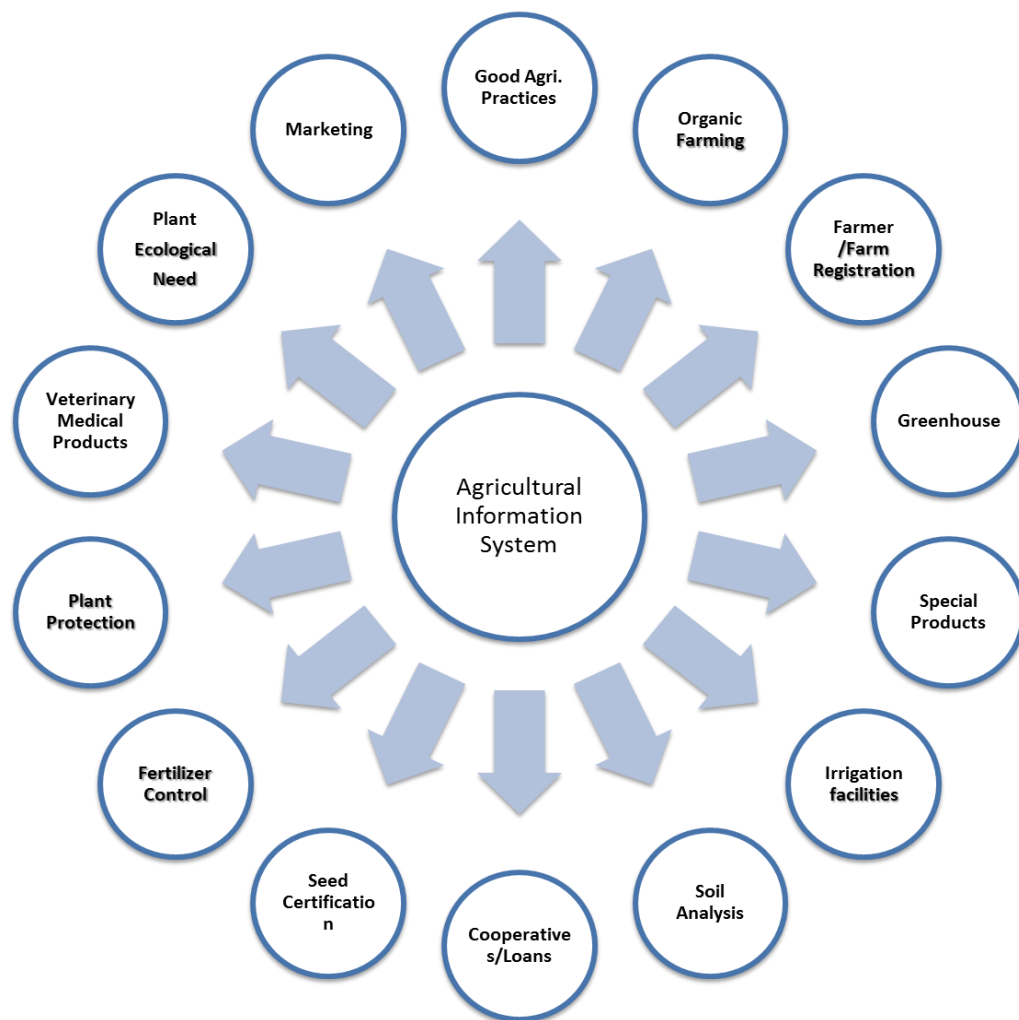


Each parcel has access to the road and irrigation canal



Established Integrated Agricultural Inventory System

40 different geo-databases are integrated to Agricultural Inventory System



Since 2006, 50% grant is giving by MoFAL under the Support Program of Rural Development Investments

| | Max. subsidy | Number of Project | Total Grant |
|---|--|-------------------|-----------------------|
| Greenhouses – using alternative energy resources | 3 Millon TL | 271 | 54,3 Millon TL |
| Agricultural Holdings- using Jeothermal, biogas, solar or wind energy | 3 Millon TL | 21 | 3,5 Millon TL |
| Irrigaiton System with Solar Energy | Intividuals: 50.000TL Private: 100 000 TL | 61 | 1,3 Milon TL |
| TOTAL | | 353 | 59,1 Millon TL |

In IPARD, investment for renewable energy for the consumption of agricultural holdings itself has been supported since 2014. (Solar, Wind, Thermal Energy or biomass system)

In IPARD-2, new supports will start for renewable energy investments. (end of 2015)

- Un-certified electry powders, micro electiricity producer and heating systems.
- Max limit.,2 Millon EUR, grant rate is 100 %.

Rural Energy Resource Center” has been established by Samsun Black Sea Agricultural Resource Center (30h December 2011).

- They have 13 projects on the usefulness of agricultural residuals for energy production.

First irrigation machine with Mobile Solar Battery

Patented in February 2014. Available to work continuously 14 hours in sunny summer period, pumping water from 170 m depth, can irrigate as 50-150 da

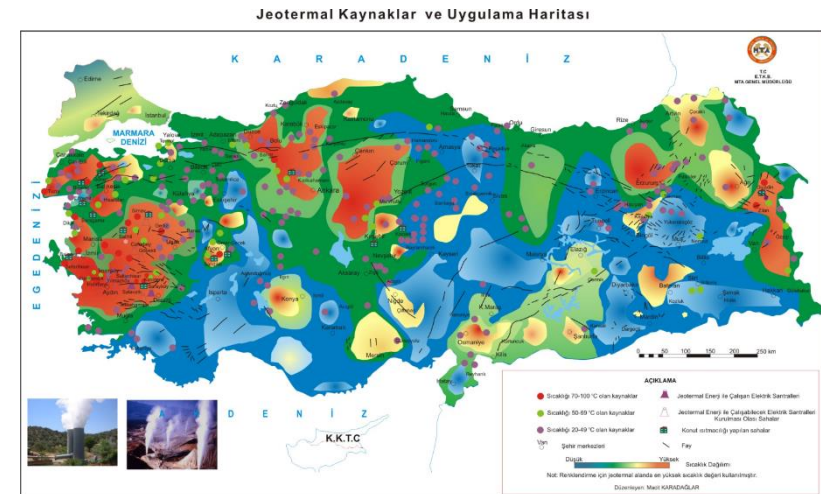


Other Projects

- In order to consume energy to irrigation, wind tribune (50kW/ha) has been installed by Eskişehir Agricultural Resource Center.
- Solar Field has been established by Diyarbakır GAP International Agricultural Resource and Training Center.
- In the area as 3 da produce 50% of electricity demand of institute

THERMAL ENERGY

- Our potential is 7th in the world, 1th in EU-27
- thermal – greenhouses,
In 2004, 360 da
In 2014, 3850 da
- Our target to reach 25.000 da areas of
thermal – greenhouses next 5 year.
- **Potentially Important Provinces** : Afyon,
Aydın, Denizli, Diyarbakır, İzmir, Konya,
Kırşehir, Kütahya, Manisa, Şanlıurfa ve
Yozgat
- Organized Greenhouse Zones.
(Exp :Denizli-Sarayköy)



BIOMASS

According the Demirtas *et al*, 2001

- Annual biomass weight potential is **117 Million ton.**
- Equivalent petroleum : **32 Million Ton**
- Petroleum consumption : **1,6 Million Ton / Year**
- Rural Biomass potential 10 times bigger that petroleum consumption in Agriculture
- Total Bioenergy potential is around **17,2 Million Ton equivalent petroleum.**

| Biomass | Annual Biomass Weight (Million ton) | equivalent Petroleum (Million ton) |
|--|-------------------------------------|------------------------------------|
| Annual Crops | 55 | 14,9 |
| Perrenial Plants | 16 | 4,1 |
| Forest Residuals | 18 | 5,4 |
| Agricultural Industry Residuals | 10 | 3,0 |
| Wood Industry Residuals | 6 | 1,8 |
| Animal Production Residuals | 7 | 1,5 |
| Others | 5 | 1,3 |
| Total | 117 | 32 |

BIODIESEL & BIOFUEL

- In dryland, crop production potentially important for biodiesel production has been supported.
- **Cooperation Agreement for Biofuel Production was signed between MoFAL and MoENR at 2013**
- Since 2014, the safflower, canola, soybean and sunflower have been subsidized as an addition of contracted farming payment (15 TL/da).
- **Until 2023, in 1 Million ha areas,** safflower, canola, soybean and sunflower will be produced by using contracted farming model.
- **Also, Bio-ethanol, Bio-methanol and Bio-butanol production from agricultural residuals are planned for near future.**

WASTE ENERGY FROM OIL FIELD, THERMAL AND NUCLEAR POWER PLANTS

In Batman, Adıyaman, Siirt, Diyarbakır, Mardin provinces, drained hot water from oil field can be useful for agriculture. (heating system for greenhouses)

Drained hot water form Energy Powers.

- Drained hot water from **Soma Hydroelectric Power** has a potential for heat up to **greenhouses as in 500 da areas.**
- Drained hot water from **AKKUYU nuclear power** plant has a potential for heat up **greenhouse as an area of 5000-10000 da**

THANK YOU !

Dr. Gürsel KÜSEK
General Directorate of Agrarian Reform