Energy Efficiency In The Egyptian Food Industries

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Federation of Egyptian Industries

Since 1922

20 Chambers

60,000 Membership

20% of annual GDP

Environmental Compliance Office FEI/ECO

Established in 2001 within the Federation of Egyptian Industries (FEI) with the aim of presenting services to the industrial SME concerning Sustainable Development.

Main Services

- Technical & Financial assistance for implementing Cleaner production ,energy efficiency & Renewable Energy technologies in industrial sector.
- **CFP** measurement provides Egyptian companies with opportunity to present their products to international markets.

Main Activities

- Egyptian Solid Waste Management Council (ESWMC)
- Responsible Care in Chemical sector
- REEF- Resource Efficiency in the Food Industry .
- The private Pubic Sector Industry (PPSI) Project
- Integrated Electronic Waste Management System
- Industrial ECO Parks (Green Industrial City)
- Corporate Social Responsibility S&M Enterprise

Financial Support
Soft Loans

- Financing new industrial equipment for implementing Energy Efficiency, Renewable Energy and Cleaner Production technologies in industrial sector .
- Loans up to EGP 3 million per enterprise.
- Repaid over 5 years including one year grace period.
- With an 2.5% interest rate per year; can be through the National Bank of Egypt or other

Partners

Ministry of Trade and Industry

Egyptian Environmental Affairs Agency (EEAA)

برنامج تحديث الصناعة
INDUSTRIAL MODERNIZATION PROGRAMME

البنك الأهلي المصري
NATIONAL BANK OF EGYPT

NATIONAL SOCIETE GENERALE BANK

Industrial Development Bank

UNIDO United Nation Industrial Development Organization

Canadian International Development Agency

TEKNOLOGISK INSTITUT

Schneider Electric

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

kfw ENTWICKLUNGSBANK Kreditanstalt für Wiederaufbau

Danida Danish International Development Agency

FORMIN.FINLAND.FI Finnish International Development Agency (FINNIDA)

COWI

ILSI

EPF Environmental Protection Fund

EOS Egyptian Organization for Standardization and Quality
الهيئة المصرية العامة للمواصفات والجودة

Sida

PPSI Private Public Sector Industry Project

SIS SWEDISH STANDARDS INSTITUTE

DI Confederation of Danish Industry

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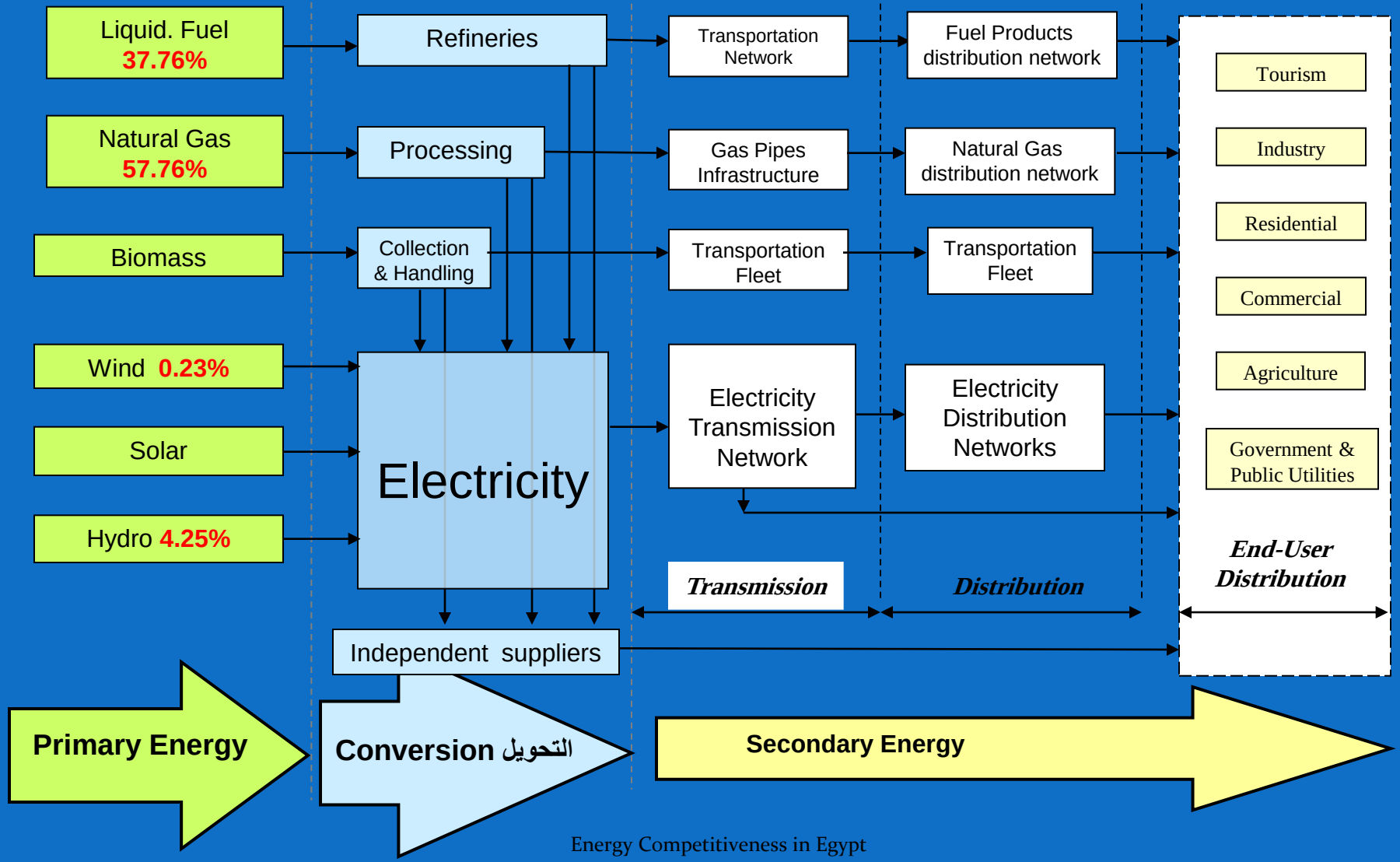
Sustainable Development challenges

- The SDS deals with the main challenges that affect sustainable development, namely related to:-
- Human,
- Natural,
- Energy,
- land,
- Water resources

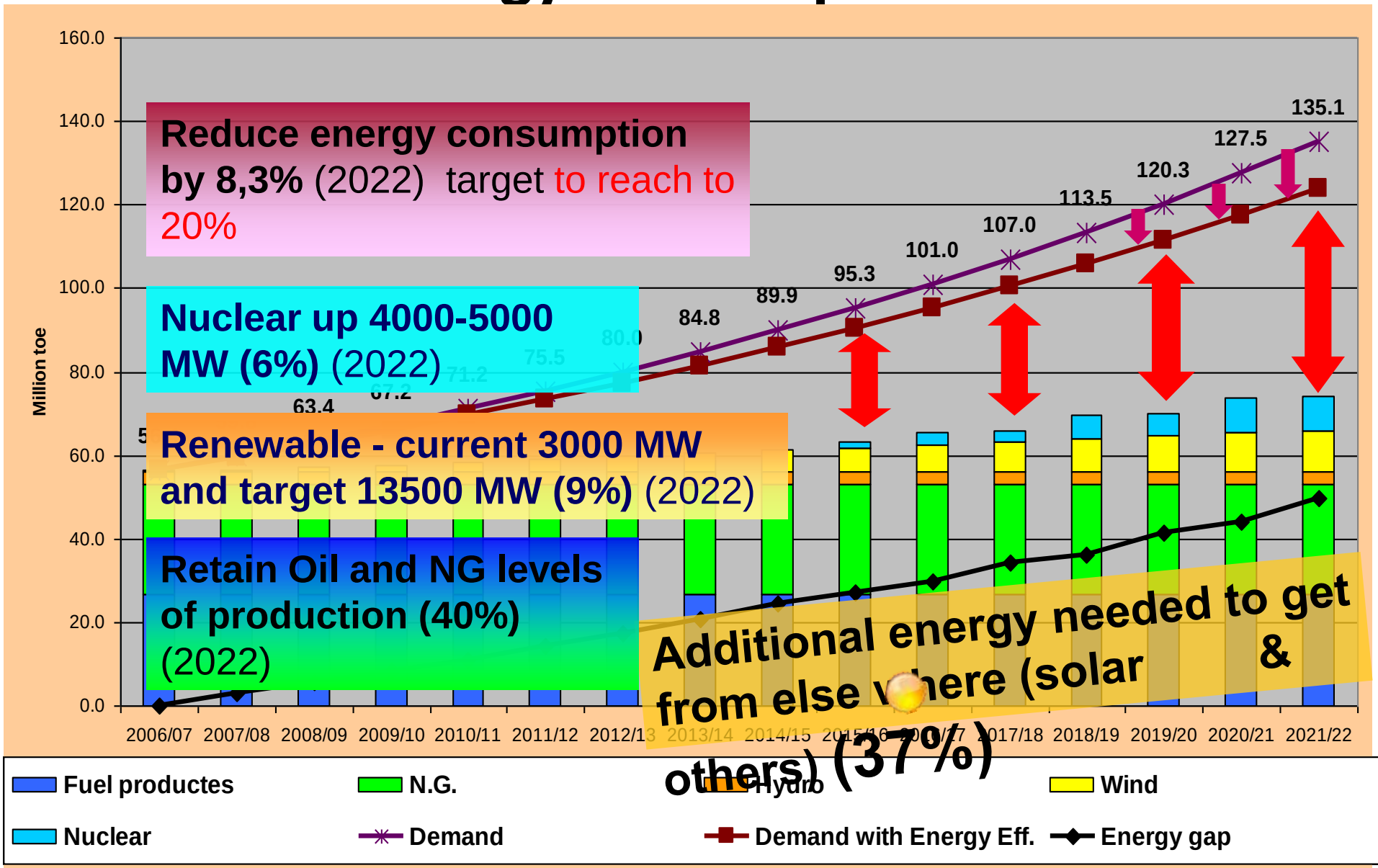
Energy Sources / Energy Efficiency

Based on the Strategy, The Egyptian government aims at maximizing the efficiency use of domestic energy resources (traditional and renewable)

The principal Energy Flows in Egypt



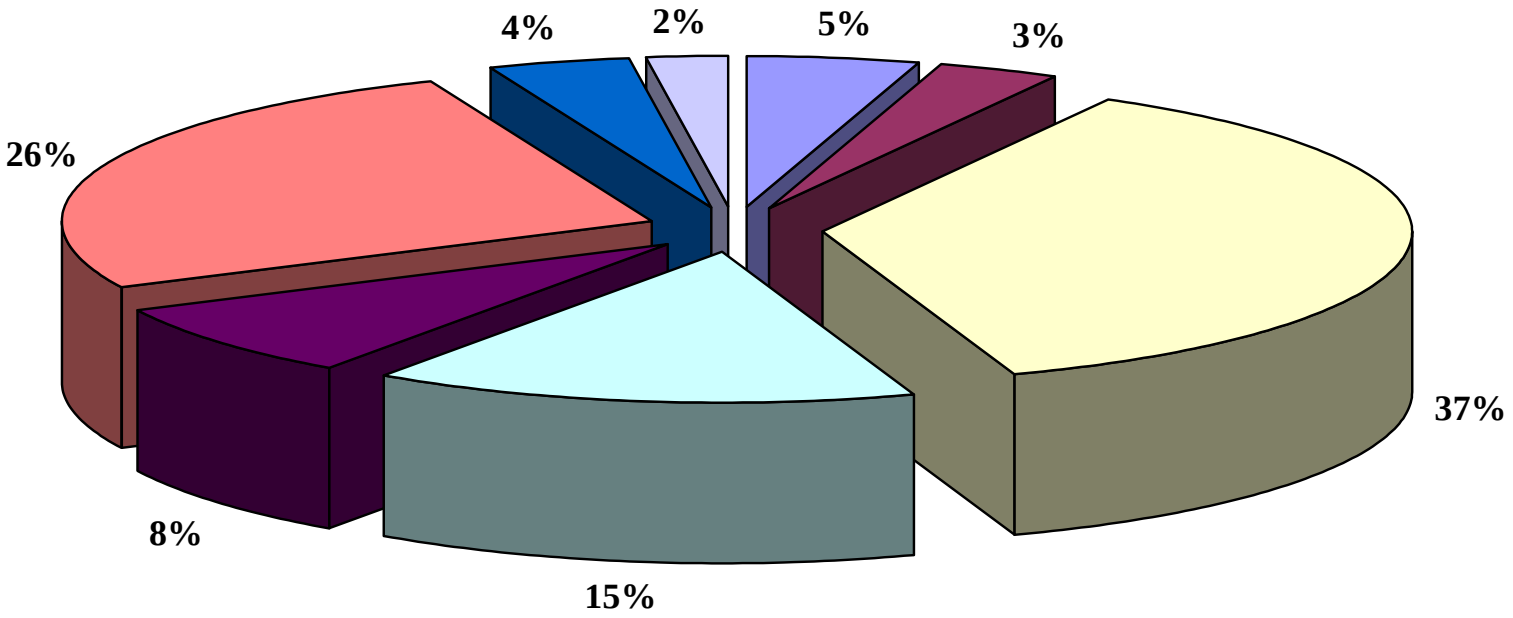
Current Statues &Future development of Energy Status up 2022



Contributions to the 20% EE target reduction

- **At the end user levels of energy**
  - Industry **9.4%**
  - Transportation **4.5%**
  - Residential and Commercial **3.0%**
  - Government and public utilities **0.45%**
  - Agriculture and irrigation **0.05%**

Energy End Use in Egypt



Specific Energy Consumption in Food Sector

- SEC in average to 84 kg equivalent oil/ton product .
- Egyptian food industries represent 8% of the total energy consumption in industrial sector.
- It is possible to reduce the SEC of the calculated values of the company, regardless of the increase in production by implementing energy saving measures
- Energy savings can be achieved in these industries ranges from 25-60%

Energy Efficiency Activities in Egypt

- Energy Efficiency Measures in Egypt over the last 32 years tackled five main areas. These areas are:
  - Institutional Development
  - Legislations and polices
    - **Energy Subsidy Cut gradually for five years .**
    - **Feed in Tariff (renewable energy)**
    - **Egyptian Electricity Law**
  - Training and awareness
  - Energy information systems (case studies, etc)
  - Technical programs and Implementation projects (moderate number of implementations)

Renewable Energy: Current Situation

- 750 MW wind farms has been operated in stages since 2001
- 140 MW CSP power plant including
- Solar field of 20 MWe based on parabolic trough technology and
- 120 MW combined Cycle. It has been operated since July 2011.
- 30 MW PV power plants in Siwa, Farafra, Marsa Alam, Halayb, Shelateen and AbuRamad cities since March 2015.

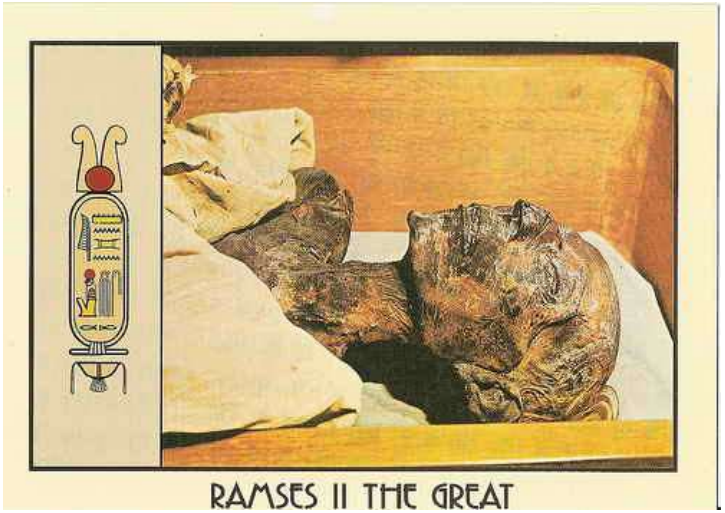
Renewable Energy Generation Plan by 2022

The Egyptian RE strategy is targeting 20% of the electricity generation by year 2022 as follows:-

Source	Capacity (MW)	Energy (TWh) & %
Wind	6810	30.6 (12%)
Solar	2879	2.2 (2%)
Hydro	2800	14 (6%)

Egyptian Food Processing

Started around the Valley of River Nile 5000 B.C.



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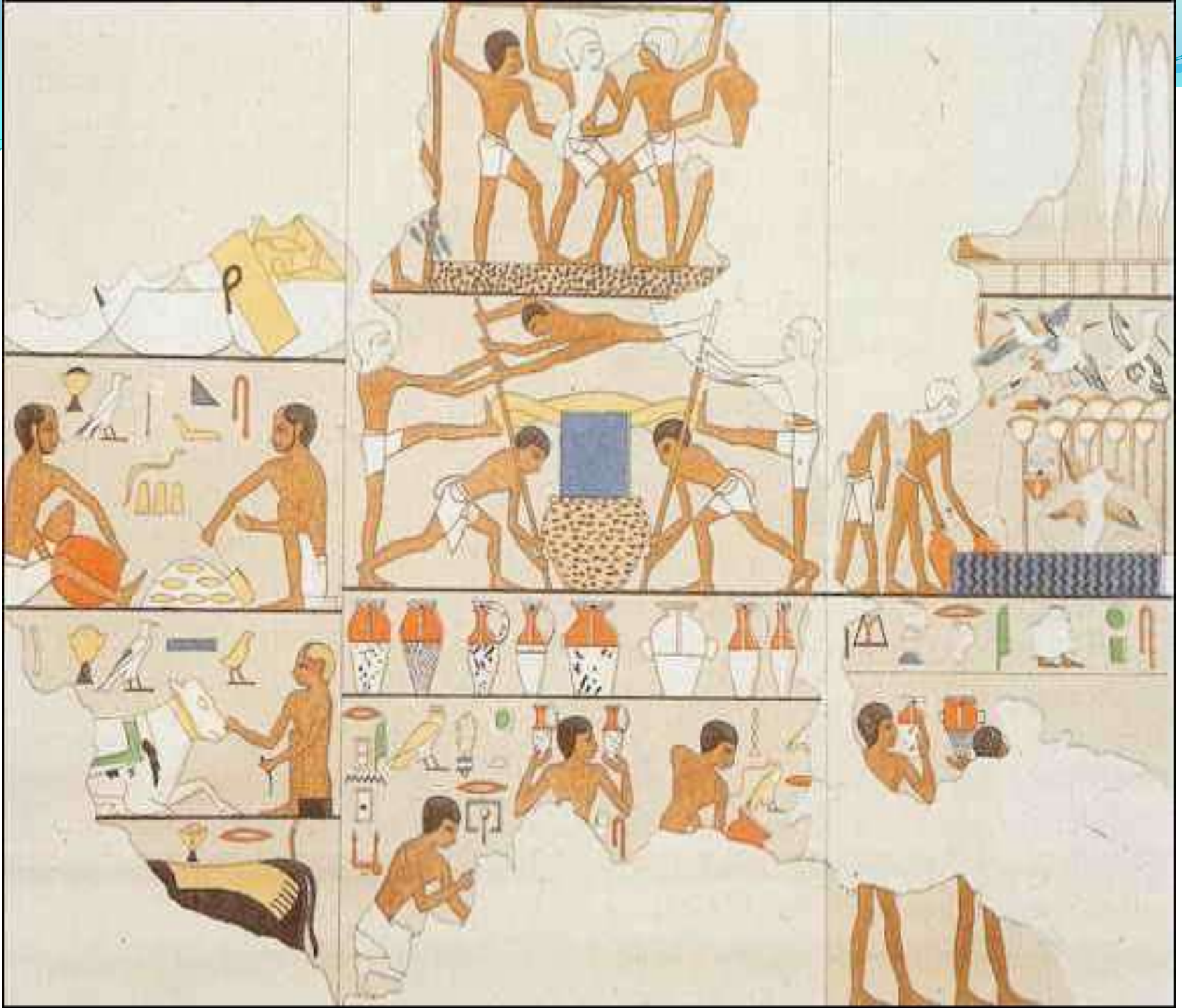

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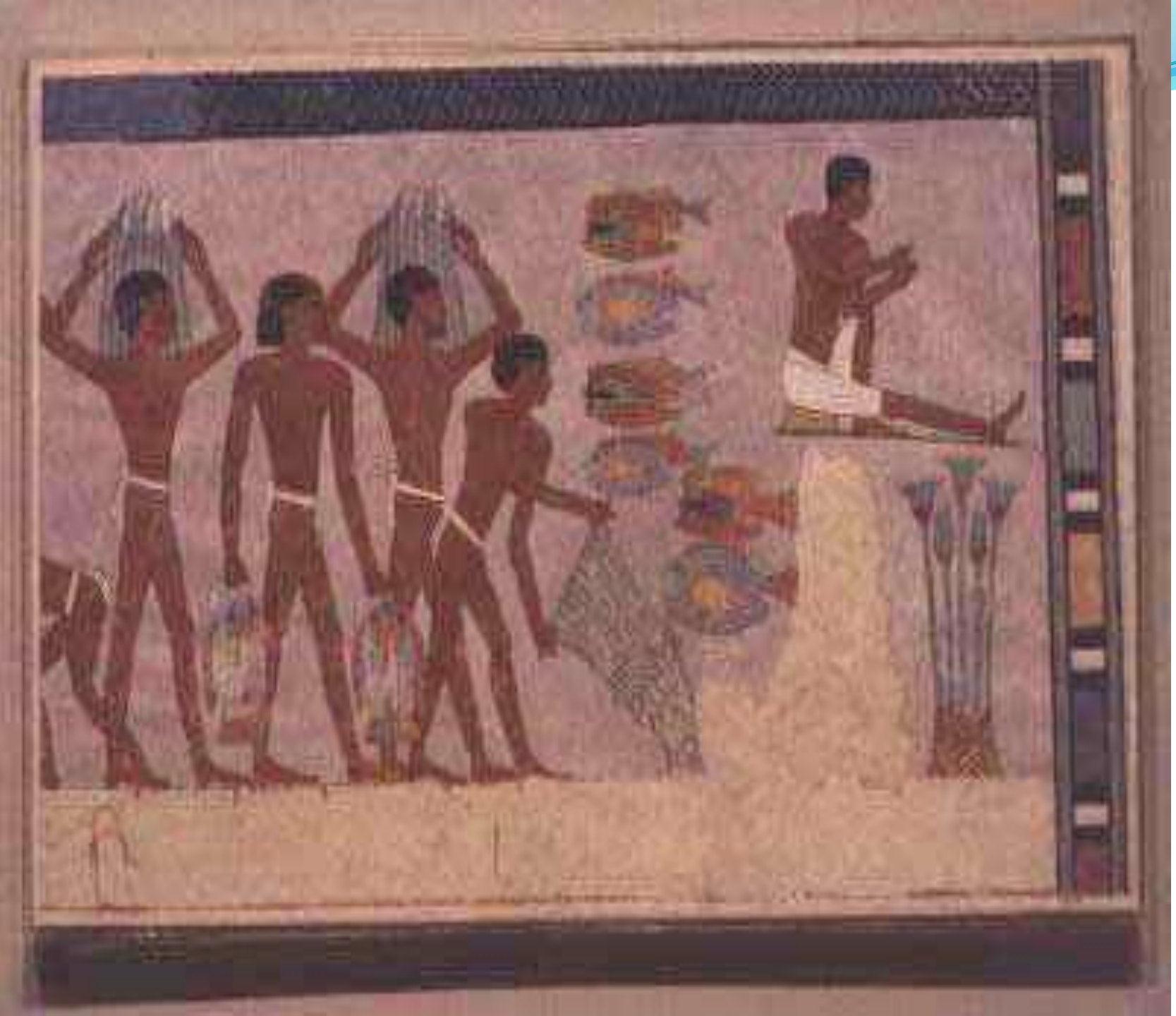
siphons used in the year 1450 B.C.



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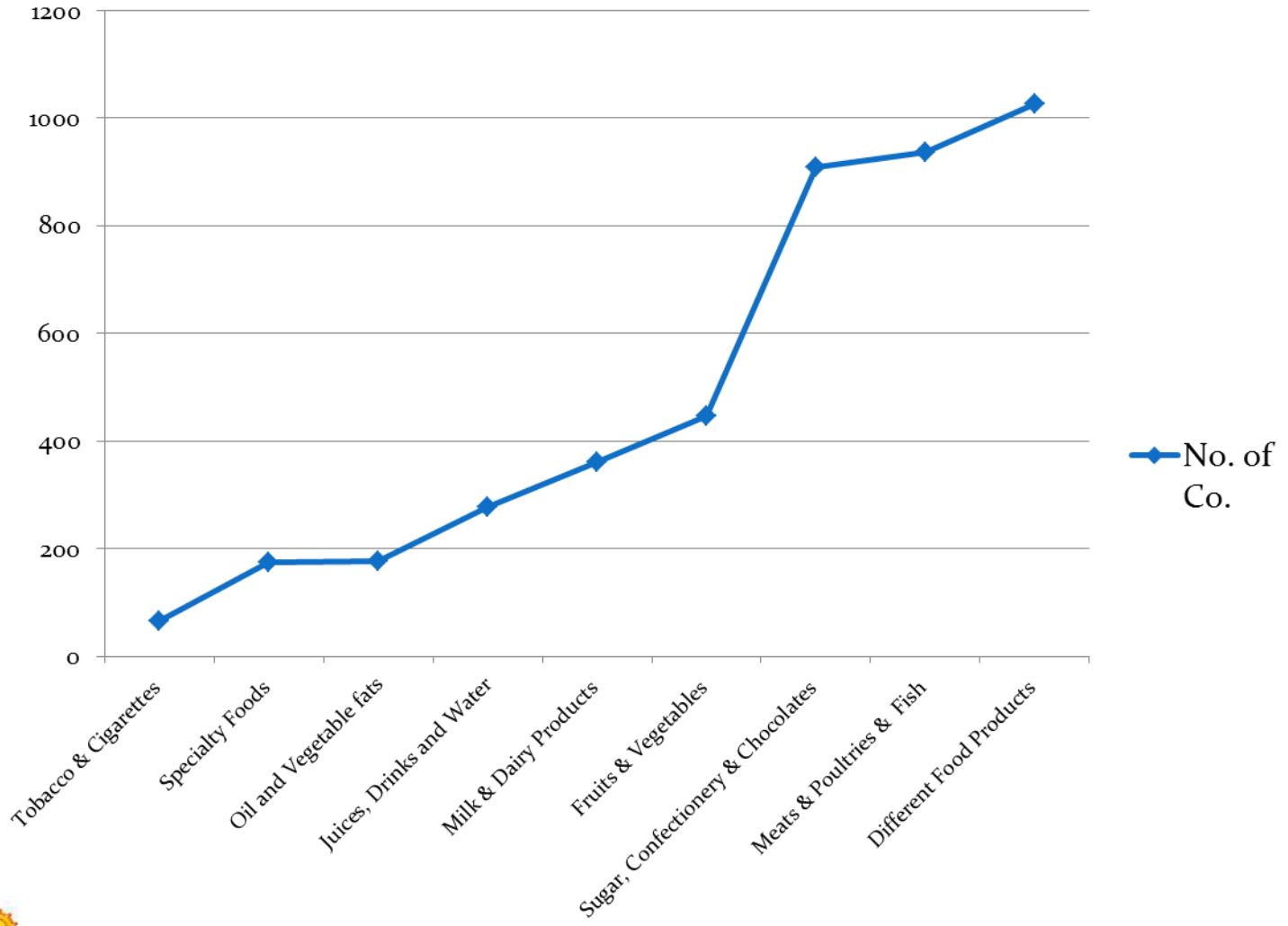
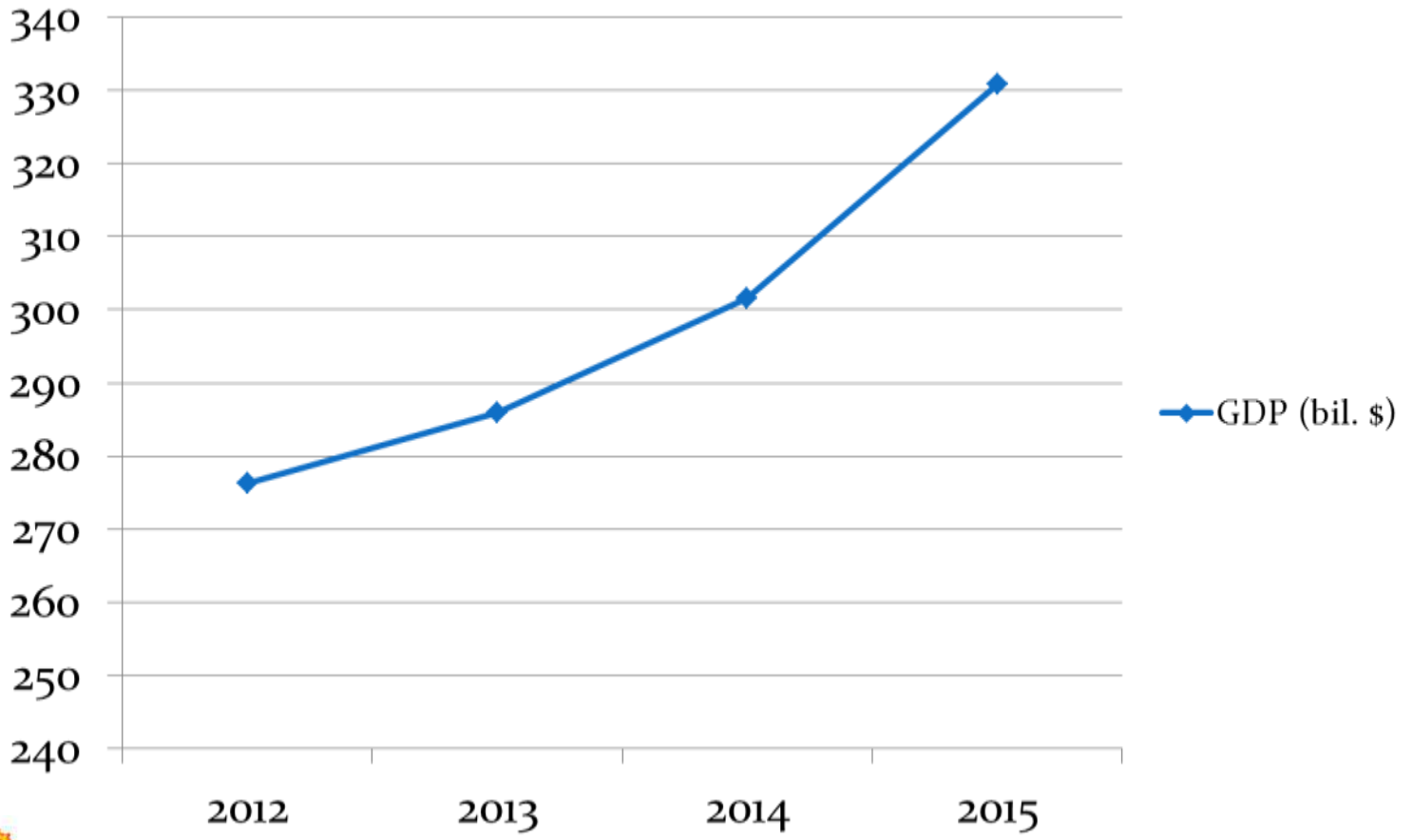
Egyptian Food Industries

- Ranked as # 3 of Egy. Industrial Sectors :
  - Number of registered Companies
  - Labor force
  - Export

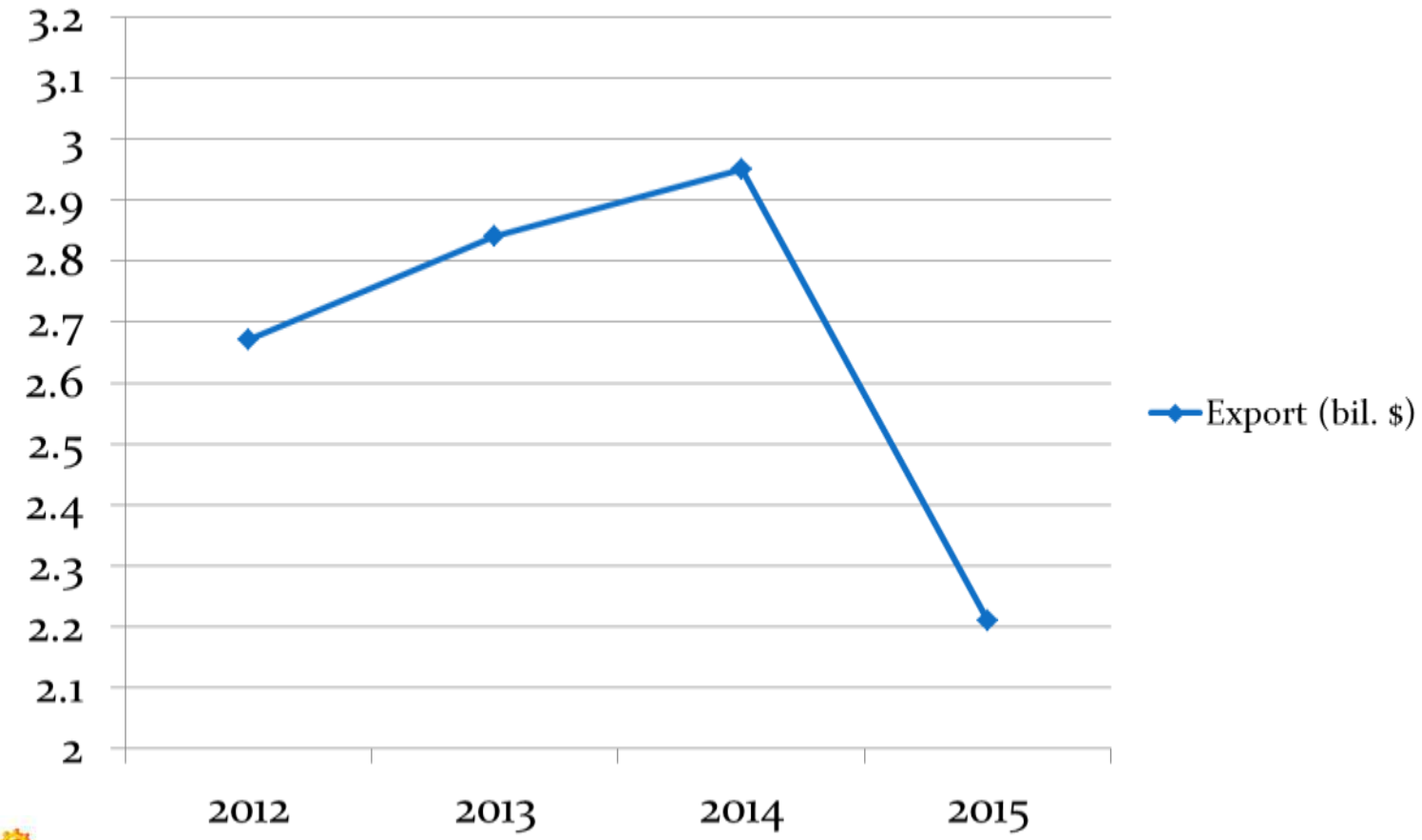
Egyptian Food Industries

- Including 9 industrial activities:
  - Tobacco & Cigarettes
  - Specialty Foods, yeast and food additives Food Additives
  - Oil and Vegetable fats
  - Juices, Drinks and Water
  - Milk & Dairy Products
  - Fruits & Vegetables
  - Sugar, Confectionery & Chocolates
  - Meats & Poultries & Fish
  - Different Food Products


1200
1000
800
600
400
200
0
Tobacco & Cigarettes
Specialty Foods
Oil and Vegetable fats
Juices, Drinks and Water
Milk & Dairy Products
Fruits & Vegetables
Sugar, Confectionery & Chocolates
Meats & Poultries & Fish
Different Food Products
No. of Co.


340
330
320
310
300
290
280
270
260
250
240
2012
2013
2014
2015
GDP (bil. $)

Egyptian Food Industries Export



Energy Efficiency in Food Sector

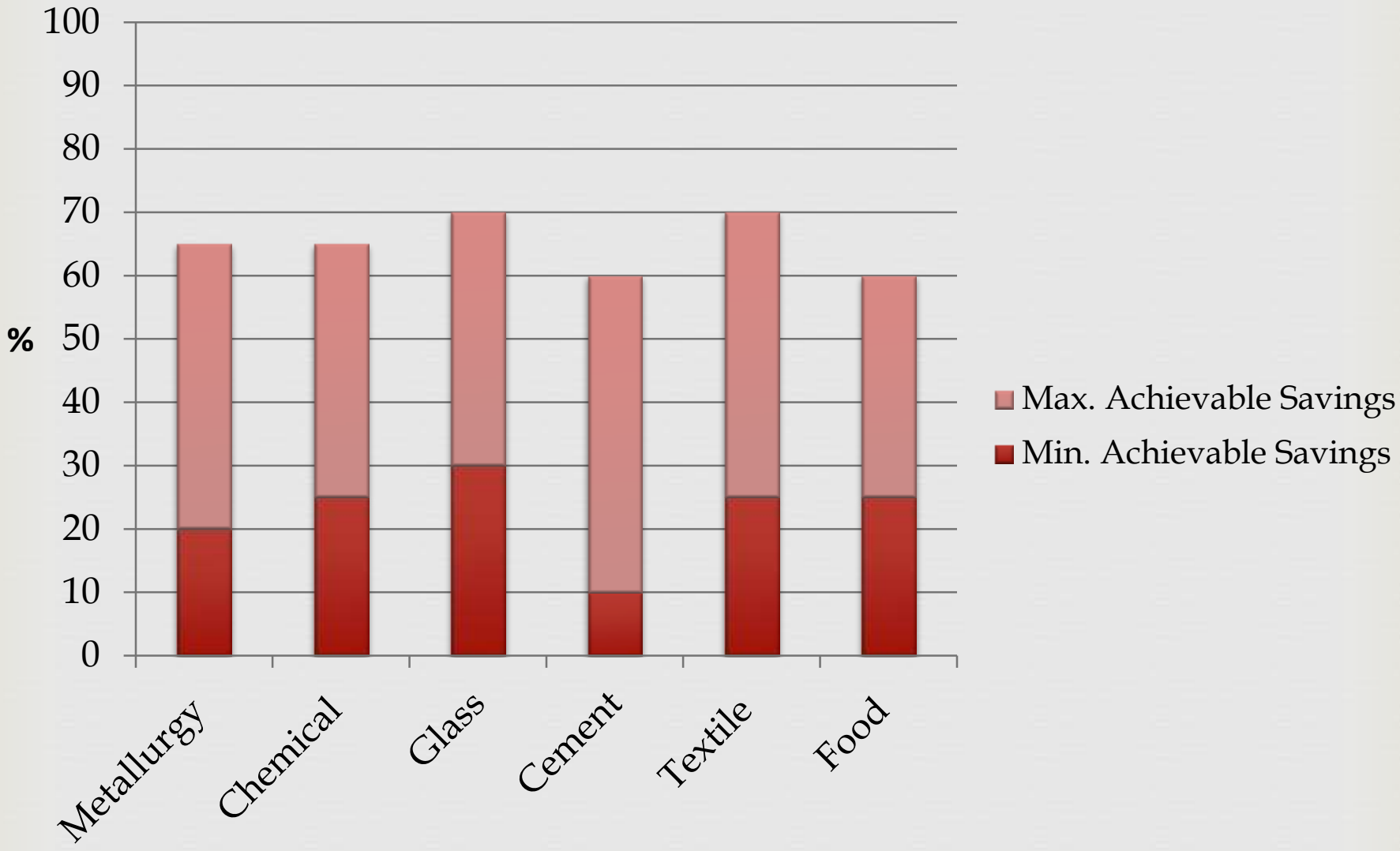
Utilities Technology &EE Opportunities

- New Design Concepts for Boilers.
- Dry Type Transformers versus Oil Type Transformers.
- Absorption Technology versus Vapor Compression Technology.
- Robotic (Intelligent) Machinery versus Ordinary Production Schemes.

Energy Efficiency Technologies

- Improving Combustion Efficiency
- Steam System Optimization & Insulation
- Waste Heat recovery
- Power Factor Improvement (PFI)
- High Efficiency Lighting (HEL)
- High Efficiency Motors (HEM)
- Variable speed drive for Compressors
- Cooling system improvement
- Co-Generation

EE Saving Potentials in Major Industries



EE Project	Potential Energy Reduction	Application
Waste Heat recovery [A)]	30 %	Boiler installations and furnaces All sectors
Combustion efficiency improvement [A)]	5 ~ 10 %	All sectors
Steam system improvement [B)]	10 ~ 20 %	**Food,** chemical, textile sectors
Cogeneration [A)]	50 %	**Food**, chemical, textile sector companies with low-pressure steam demand
Absorption chillers [A)]	(N/A, economic savings only)	Cooling demand above 5-10 ºC (mostly for AC) Improving cooling system especially in food sector
Compressed air generation/ distribution improvement [B)]	10 ~ 15 %	All sectors with pneumatic systems
Cooling system improvement [B)]	10 ~20 %	**Food sector**
Boiler tune-up [B)]	10 %	Food , chemical, textile sectors
Fuel switching [B)]	5 ~ 10 %	All sectors
High efficiency lighting [B)]	30 %	All sectors, commercial buildings
High efficiency motors, pumps and fans [B)]	10 ~15 %	All sectors
Variable Speed Drive [B)]	20~30 %	All sectors, especially for pumps and fans
Power factor improvement [B)]	5 ~ 10 %	All sectors

EE Projects in Food sectors

- Combustion Control
- Steam System Improvement
- Cogeneration
- High Efficiency Lighting
- Power Factor Improvement

EE Projects in Food sectors

- Heat losses during roasting of sesame

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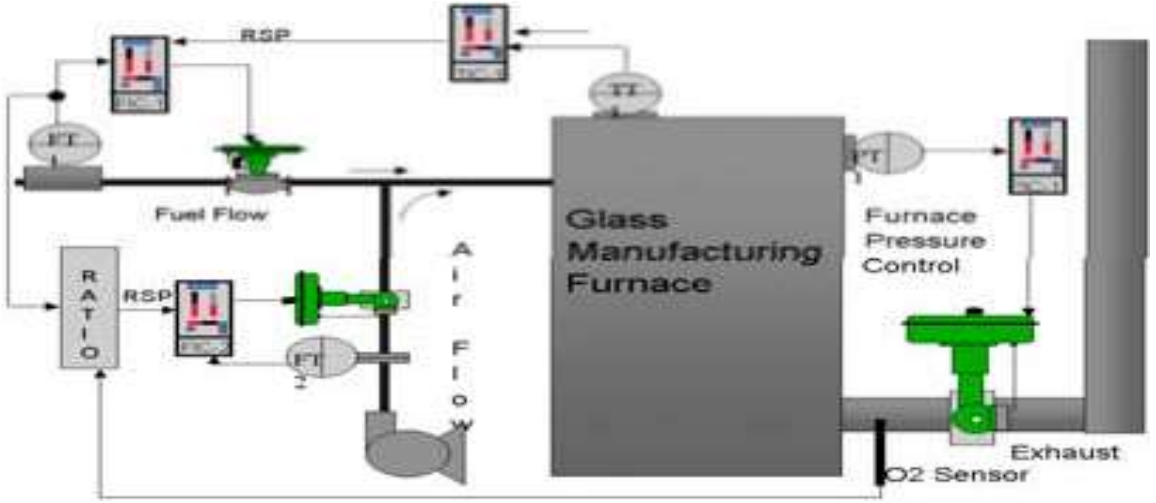
Improving combustion Efficiency

- Adjust the thermal performance of boilers and furnaces, and improvement of combustion efficiency by controlling the ratio of air to fuel using mobile gas analysis devices to reduce fuel consumption between 1-7%, which helps to reduce pollutants and their conformity with environmental law



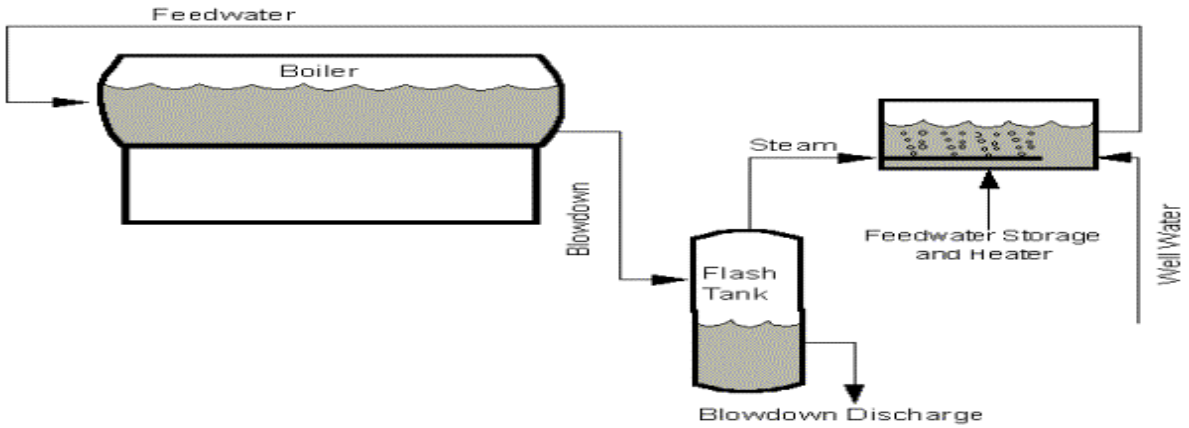
Steam System Optimization

- Installation of Condensate Return and went to retrieve water blow down heat content and repair leaks and insulation inspection in addition to maintenance steam traps for condensate.

✓ Annual savings = 480,500 L.E/year.

✓ Investment cost = 600000L.E .

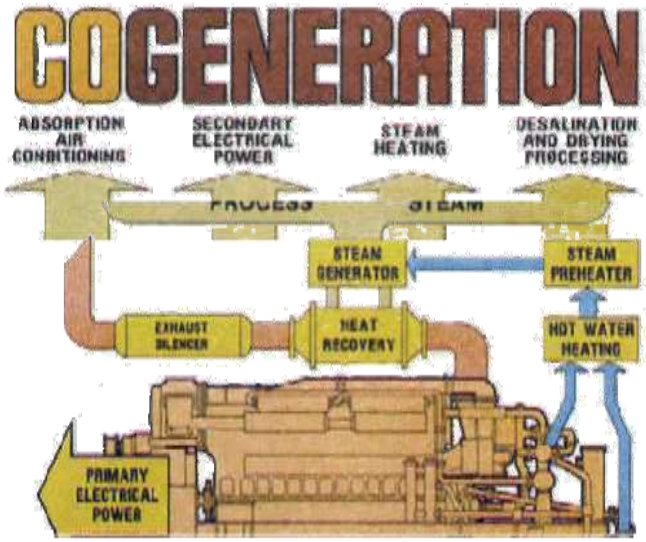
✓ The Pay back period = 15 months



COGENERATION

- Cogeneration is the simultaneous production of electricity and thermal energy from the same fuel source.

- **Fuel switching is to use:**
- **Natural gas**
- **Biofuel.**
- **Agro waste**



Power factor Improvement

- Reduction of loss in distribution network and increase internal network capacity for electricity.
- Increase the share of productive uses in generating capacity.
- Contractual capacity reduction and the use of different scale for calculating the cost of KWh consumption.
- reducing emissions from reduced the decrease in the internal network which represent 5% of annual consumption of electrical energy.

Power factor Improvement

Installation of condensers to improve PF from 0.85-0.91.

- Annual saving = 100 000 L.E/year as a result of the provision for the estimated annual reduction due to low power factor. And reduce energy demand payments.
- Investment cost = 150,000 L.E.
- Pay pack period = 18 months

Replacement of light sources with high efficiency lamp

Replace fluorescent longitudinal 60 cm (4*20 watt) headlamp by led lamp provided 32 watt

Characteristic	LED 60cm*60cm
Equiv. To LED	4* 8W
Power	<40W
Saving	80%
Type of LED	SMD
Eff.	70 lm/w
Input	(85-265 v)AC
Lumen	2600-2800lm
No. of LED units	72
Life time	50000hr

Replacement of light sources with high efficiency lamp

- The total investment required to replace bulbs = 853660 L.E
- Savings resulting from the reduction in the rate of consumption of lighting = 286608 L.E/year
  period of investment recovery = 36 months

Potential Energy Savings in Egy. Food Industries

Process Heating

Measures	Potential of Energy Saving
Install economizer to recover exhaust gas heat for warming feed water	Up to 30%
Reduce blow down losses by boiler feed water preparation	15%
Recover exhaust gas heat to preheat Combustion air of burner	10%
Use thermal insulation for boilers and heat pipes	10%
Adjustment of Air/ Fuel ratio of the burner	7%

Potential Energy Savings in Egy. Food Industries

Compressed Air

Measures	Potential of Energy Saving
Reduce leakage air losses	40%
Use speed controlled compressors	40%
Implement more efficient screw compressors	10%
Regular maintenance of the distribution net	10%
Decrease pressure by about 1 bar	7%

Potential Energy Savings in Egy. Food Industries

Electric Motors

Measures	Potential of Energy Saving
Adjust the speed of the motor to the load	10 - 50%
Switch off drives when not used	1 - 20%
Avoid the use of belts for power transmission from motor to the machine	2 - 10%
Use energy efficient drives	2 - 6%
Use proper dimensioned drives	1 - 3%

Potential Energy Savings in Egy. Food Industries

Refrigeration and Cooling

Measures	Potential of Energy Saving
Control of outlet pressure in cold compressor	15%
Appropriate loading and avoiding unnecessary low temperatures	10 - 15%
Minimize cold demand by stronger heat insulation	10%
High efficiency motors for ventilators and compressors/ condensers	5%

Renewable Energy Technologies in Food Sector

Solar Thermal Heating/Cooling

- **Solar Water Heating (SWH) and Pooling Heating**
- **Solar Space Heating & Cooling**

- **Concentrating Solar Power (CSP)**
- **Passive Solar Heating and Cooling**
- **Day Lighting**
- **Photovoltaic**
- **Biomass : either to use direct burning or to get the biofuel.**
- **Biogas**

Conclusions

- High potential for EE project implementation in food sector in Egypt
- Implementation must be supplemented by proposed consultancy, dissemination, and awareness-raising activities for effectiveness and sustainability
- Energy subsidy cut is a driving force for EE investment
- EE projects and activities inline with national environmental and development goals

شكراً لكم

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