

Energy Outlook: Shaping the Future!

Gamal A. Hassan

July 18, 2013

Personal view from outside Egypt

Key points for discussion

- Offshore Technology Conference; Egypt should have a Energy Conf.
- Egypt energy status & Enhance the ability to deal with international companies
- Energy efficiency & country technology roadmap
- Energy-Water strategy
- Data bank and reserve managements
- Energy security and Strategy
- Accelerate in the energy sector, sustain current production and accelerate the development of new production capacity
- Abrupt transition to balanced the energy mix
- Restructuring the Ministry of Petroleum and Mineral Resources (MPMR)

Offshore Technology Conference

OTC is the largest energy conference in the world with more than 100,000 attendance and 2700 company participate in the exhibits, and more than 90 Acres of exhibit space. (49%)



Offshore Technology Conference

OTC 2014 will take place 5–8 May at Reliant Park, Houston, Texas, USA. 2014 marks the 45th anniversary of the conference.



Arctic Technology Conference

OTC's Arctic Technology Conference, a highly focused event that addresses Arctic E&P, will take place 10-12 February 2014 in Houston, Texas, USA.



OTC Asia

We are pleased to announce OTC Asia—a new event that will held in Kuala Lumpur, Malaysia, 25–28 March 2014.

[Event website »](#)



OTC Brasil

OTC Brasil 2013, an event organized by IBP and OTC, will take place 29–31 October 2013 in Rio de Janeiro.

[Event website »](#)

Gamal A. Hassan

He is, the Chair of the Offshore Technology Conference executive Program Committee for 2013 and he has been on the executive committee since 2005. Also, he has been on the Executive Governor Committee for the OTC Brazil since 2011

OTC: Sponsoring Organizations

<p>American Association of Petroleum Geologists</p> 	<p>American Institute of Chemical Engineers</p> 	<p>American Institute of Mining, Metallurgical, and Petroleum Engineers</p> 
<p>American Society of Civil Engineers</p> 	<p>International Petroleum Technology Institute</p> 	<p>Institute of Electrical and Electronics Engineers</p> 
<p>Marine Technology Society</p> 	<p>Society of Exploration Geophysicists</p> 	<p>Society for Mining, Metallurgy, and Exploration Inc.</p> 
<p>Society of Naval Architects and Marine Engineers</p> 	<p>Society of Petroleum Engineers</p> 	<p>The Minerals, Metals, and Materials Society</p> 

How can you join the program committee and chair the program?

OTC: Supporting & Endorsing Organizations

<p>Brazilian Petroleum, Gas and Biofuels Institute</p> 	<p>International Association of Drilling Contractors</p> 	<p>Petroleum Equipment Suppliers Association</p> 
<p>American Association of Drilling Engineers</p> 	<p>American Petroleum Institute</p> 	<p>Association of Energy Service Companies</p> 
<p>Independent Petroleum Association of America</p> 	<p>Institute of Marine Engineering, Science, and Technology</p> 	<p>International Marine Contractors Association</p> 
<p>International Society of Automation</p> 	<p>National Ocean Industries Association</p> 	<p>Research Partnership to Secure Energy for America</p> 

OTC

- OTC Board of Directors
- OTC Technical Program (Executive Committee)
- Sponsoring Organizations
- Supporting & Endorsing Organizations
- US Department of Commerce, Energy and State
- How does it help business ?



Thank you

JOE WILSON
2ND DISTRICT, SOUTH CAROLINA
ASSISTANT REPUBLICAN WHIP

COMMITTEES:
ARMED SERVICES
EDUCATION AND LABOR
FOREIGN AFFAIRS
HOUSE POLICY

Congress of the United States House of Representatives

COUNTIES:
Aiken*
Allendale
Barnwell
Beaufort
Calhoun*
Hampton
Jasper
Lexington
Orangeburg*
Richland*
(*PARTS OF)
DINO TEPPARA
CHIEF OF STAFF
AND COUNSEL

June 27, 2007

Mr. Gamal A. Hassan
R & D Manager - Strategic Technology and Advanced Research
Baker Hughes
2001 Rankin Road
Houston, Texas 77073

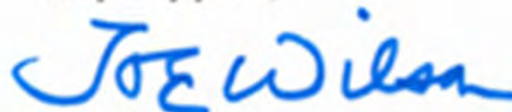
Dear Gamal,

It was a pleasure to see you recently while you were on Capitol Hill. I enjoyed talking and meeting with you.

It is an honor to represent the people of the Second Congressional District of South Carolina, and I value your input.

If I may be of assistance to you, please do not hesitate to contact me.

Very truly yours,



JOE WILSON
Member of Congress



Energy Outlook: Shaping the Future

Egypt Energy Status

- Oil and gas are two main sources of energy in Egypt
- Natural gas accounts for about 75% of electricity generation
- Oil accounts for 14% electricity generation
- Industrial production eats up about 60% of total energy
- Our current refinery capacity is about 700,000 bpd and need to be doubled
- Our current oil and gas production is way below our consumption and the differences need to be secured
- Water shortage is adding another complexity to the sector and must be considered

Egypt is facing a serious energy crisis, and unless an abrupt change will be made into our energy policy, strategy and consumer behavior, **the consequences will be sever and we will no longer be able to provide affordable energy to our citizen and future generations**

Now, It is critical to delegating the authority of signing petroleum agreement (s), **after the approval of the Supreme Energy Counsel**, to the Minister of Petroleum and Mineral Resources

Drivers of our future energy

GDP growth
Urbanization

Demand Growth

Supply
Challenges

Resources
Infrastructure
Non-conventionals

Technology and
Policy

Climate change

Environmental
Constraints

Security
of Supply

Import dependence
Resource competition

Managing the Future; What I am proposing ?

Advisor to the Minister/
Supreme Energy Council

Support Organization Committees (s)

Ahmed Hashmi
Mahmoud El Gamal
Mustafa Al-Refaa
Mohamed Hashmi
James Slutz
Mike Bahorich
.....

Assistant

Reserve
Management

- **Data Bank**
- Reserve Management

**Energy
Security**

- **Energy Efficacy**
- **State Energy Company**
- Investments

Energy
Strategy

- **Tech. Transfer**
- Energy-Water
- Energy Mix
- Tax and Royalty

Innovation
& Efficiency

- **Technology Roadmap**
- Drive Collaboration
- Conference
- People

Unconventional
Resources

- 150k bpd
- Sustain Production
- **Heavy Oil**
- **EOR**
- Shale Gas

From: "Maher, Tom" <tom.maher@apachecorp.com>

Date: 04/07/2013 11:49 PM (GMT+02:00)

To: Gamal Hassan <g Hassan@petroleum.gov.eg>

Cc: teb@egpc.com.eg, Rodney.Eichler@apachecorp.com, Michael.Bahorich@apachecorp.com

Subject: Re: Thanks you; Apache Business Review Meeting on July 3,2013 in Egypt

Thanks Hassan, be assured we will do out best.

Thanks to you, Tarek, and the other EGPC Deputies for making the time to spend with the Apache team. Many of my guys at Khalda came up to me today to say **that was the most productive and beneficial meeting they have been a part of at EGPC.**

lines of communication open and fresh.

Best regards,

Tom

Sent from my iPad

On 04/07/2013, at 5:59 PM, "Gamal Hassan" <g Hassan@petroleum.gov.eg> wrote:

Dear Tom,

On behalf of the Egypt Ministry of Petroleum and Mineral Resources, I would like to thank you and your team for the excellent business review meeting which we had yesterday. The meeting was very productive, and we are please with Apache capabilities, performance, and its commitments toward Egypt.

We are sure that you and your team will continue finding innovation business and technological solutions to enhance production, and employ more Egyptian people.

Thanks and regards,

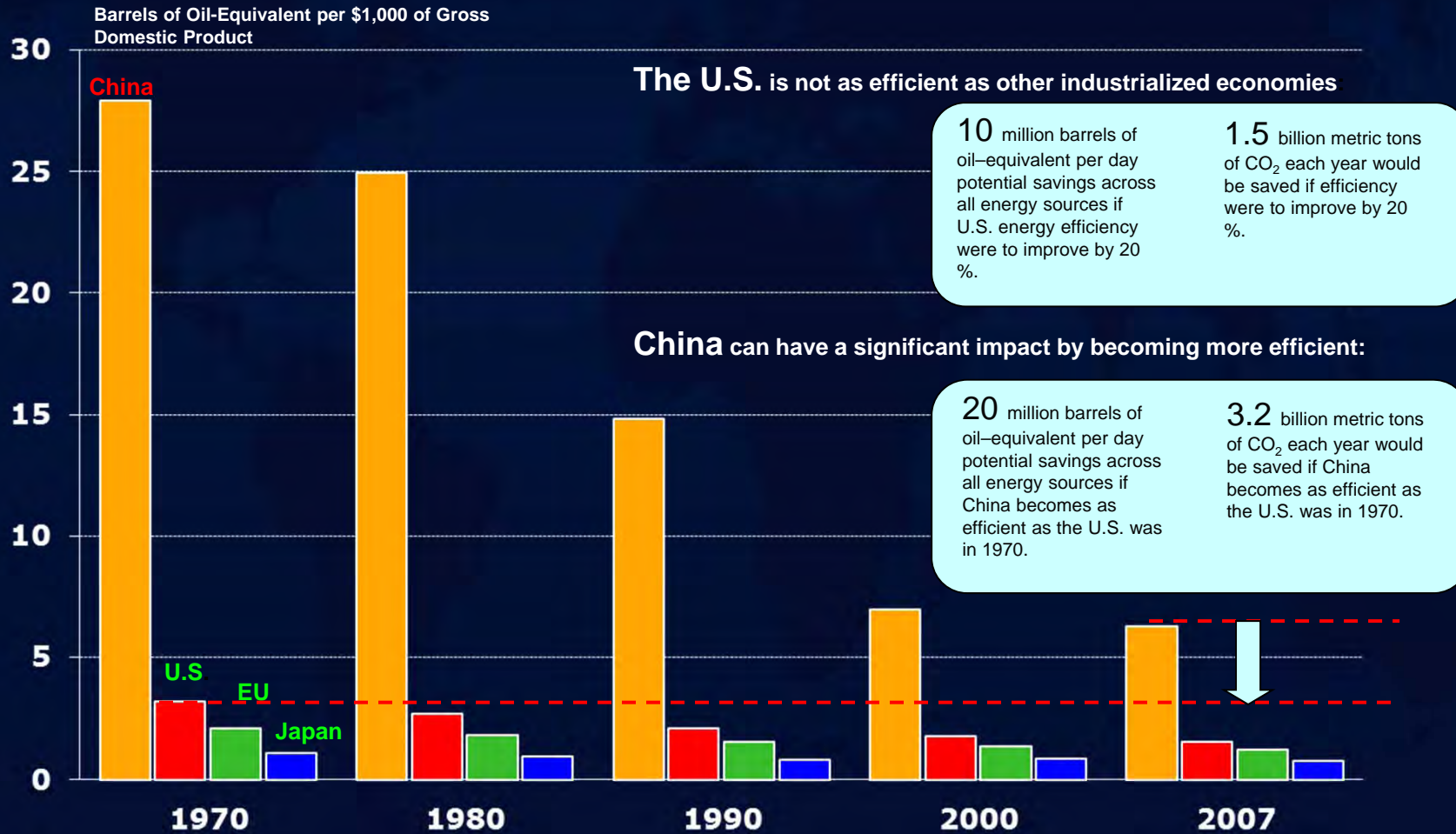
Gamal A. Hassan

Senior Advisor to the Minister

Energy Efficacy

Efficiency & Conservation are the Most Cost-Effective "New" Sources of Energy

The world is getting more efficient – but can do better.



Source: IEA Statistical Data

Egypt Energy Efficacy (generation, transmission, distribution, and usage !!!)

It is the most cost efficient means of providing new resources

Egypt has inadequate supply of domestic oil and gas and a tight public budget

Energy Efficiency Status

- No regulation to promote energy efficiency
- Little reliable data and information on energy use by subsectors
- No fuel efficiency or building codes standards
- No dedicated financial mechanisms to support energy efficiency

* view initiatives has been taken

Egypt has to create an energy efficiency entity and take a strategic approach to international collaboration

Urgent

Technology Roadmap for Egypt

Emerging innovation landscape

New R&D players

- Knowledge has been “democratized” and highly dispersed
- Disintegration of the “innovation chain”
- Growing share of R&D from small firms and “non-production” firms
- The end of the mega labs era

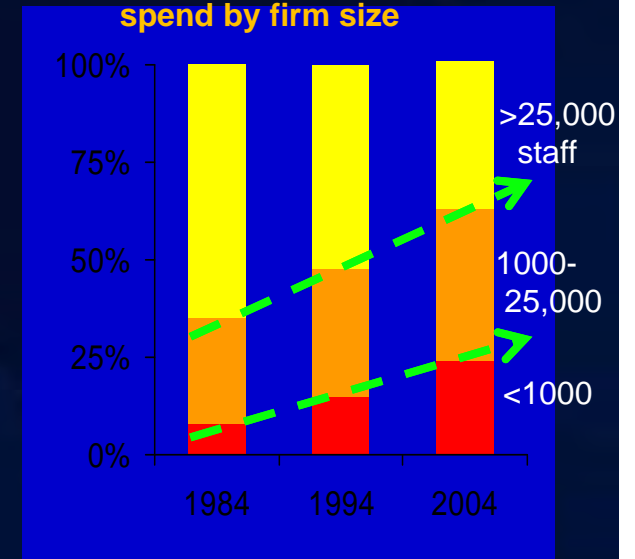
New R&D geographies

- China and India emerge as new global R&D powerhouses
- Most of the global science & technology graduates will live in Asia
- US, EU rapidly losing share in patents, R&D workforce and R&D spend

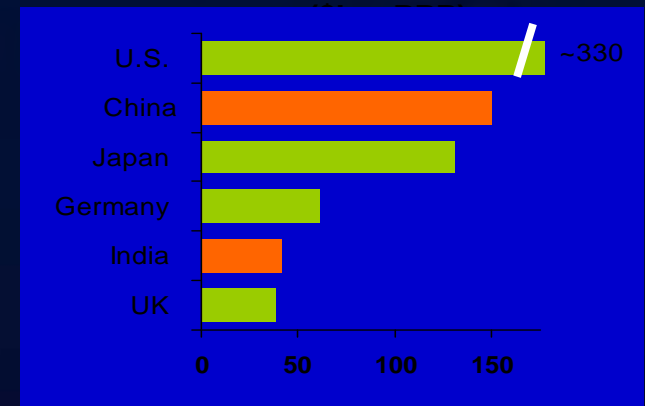
New structure of science

- Explosion of new technologies
- Continuing digital revolution enabling virtual collaboration and rapid R&D
- Rise of biology & nanotechnology as revolutionary science
- Trans-disciplinary research bringing step-change scientific progress

Share of US R&D spend by firm size



Total R&D spend 2007



E&P Future Challenges

Complexity

Changing Mode Of Operation

- Low Cost Oil
- Simple Geology
- Prolific Reservoirs
- Dry Crude (Natural Flow).
- Production

Mode

- Maturing fields
- EOR applications
- Complex geology
- Tight reservoirs
- Naturally fractured reservoirs
- Development and management mode
- Heavy Oil
- Unconventional oil resources

1980

2000

Time

2013

Technology Focus

- Reservoir management
- Heavy oil and tite/ shale oil and gas
- Improved recovery
- Subsurface imaging
- Drilling
- Refinery optimization
- Fuel efficiency

Egypt must develop an Energy Technology Roadmap for
the Energy Sector ?
In different words.....

Egypt Energy Technology Roadmap

Objective

Develop a technology roadmap by which Egypt could:

- Elevate its Fossil Energy Industry and specially its upstream oil and gas sector
- Strengthen local R&D capacity
- Know what resources and technologies are needed to meet the challenges
- Know which institutions and enterprises need to be involved in tackling each challenge
- Know who has to be trained in the required disciplines

Ultimately to the benefit of the entire economy

In more detail :

Egypt Fossil Energy: Technology Roadmap

- In more detail, the project is to:
 - Improve our understanding of the challenges faced by the Egyptian Fossil Energy Industry and thence to priorities them
 - Identify potential solutions to the challenges and examine their implementation in Egypt
 - Provide direction and focus for our Fossil Energy industry and specially the upstream oil and gas R&D efforts within the country
 - Highlight opportunities for local companies to contribute more to the upstream industry and thereby grow and develop their businesses nationally and internationally
 - Identify areas where further education, training and skills development are required within the Egyptian workforce
 - Put forward a series of actions or enablers, many but not all of them government-policy measures, with the power to accelerate progress toward the objective

Egypt Fossil Energy: Technology Roadmap

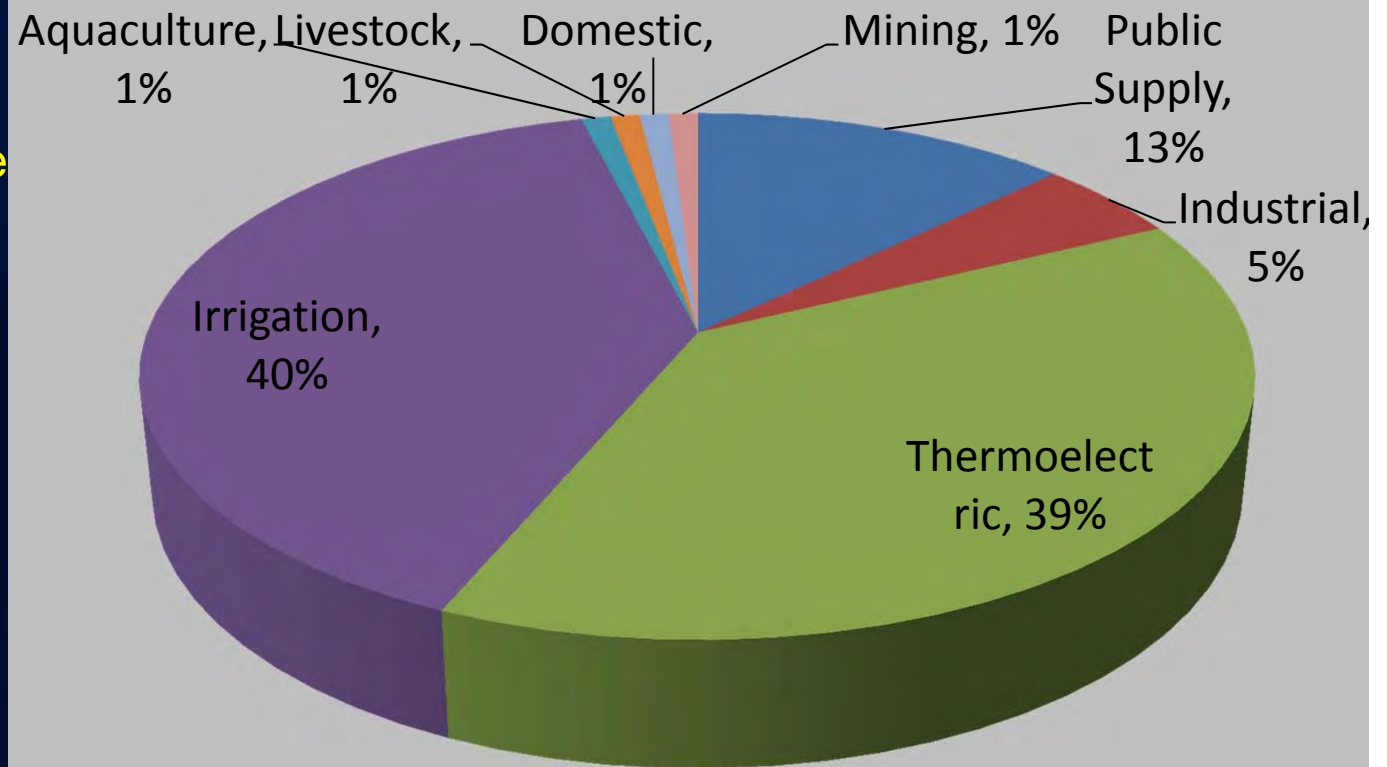
- The major operators and service companies would each outline their views on the prime challenges faced by their organizations on an annual basis. they would be encouraged to provide information on the nature and status of the challenge, its urgency and the size of the prize
- The information, once analyzed and consolidated, would be made widely available to the academic community and used to shape R&D proposals
- Cost & Funding
 - **\$3 Million dollars is the estimate coast of the project**
 - **Fund will be raised from major operator(s) in Egypt**
- Duration
 - **15-18 Month**

Energy-Water Roadmap

Water usage for Energy Sector

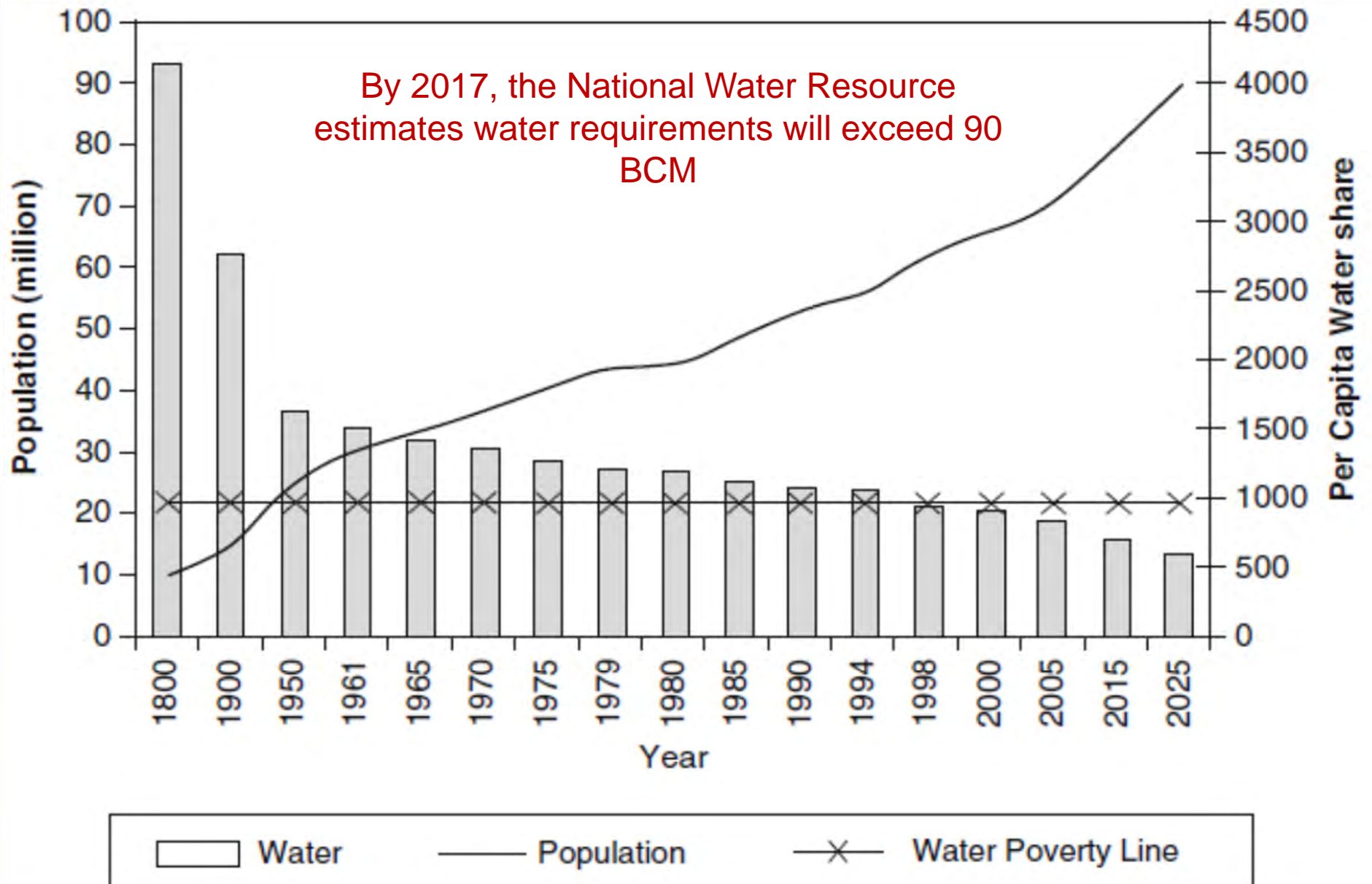
- Natural gas can be used to provide capacity during times of peak demand
- Water consumption in a commercial-scale solar power generation facility is estimated at 750 gal/MWh
- CCS increases water usage by 60-90 %

- Turbine efficiency increases as the difference between the steam temperature and the condensing temperature increases
- Coal plants operate at higher temperatures than today's nuclear plants



U.S. Freshwater Withdrawals, 345 Bgal/day

Egypt Water Challenges

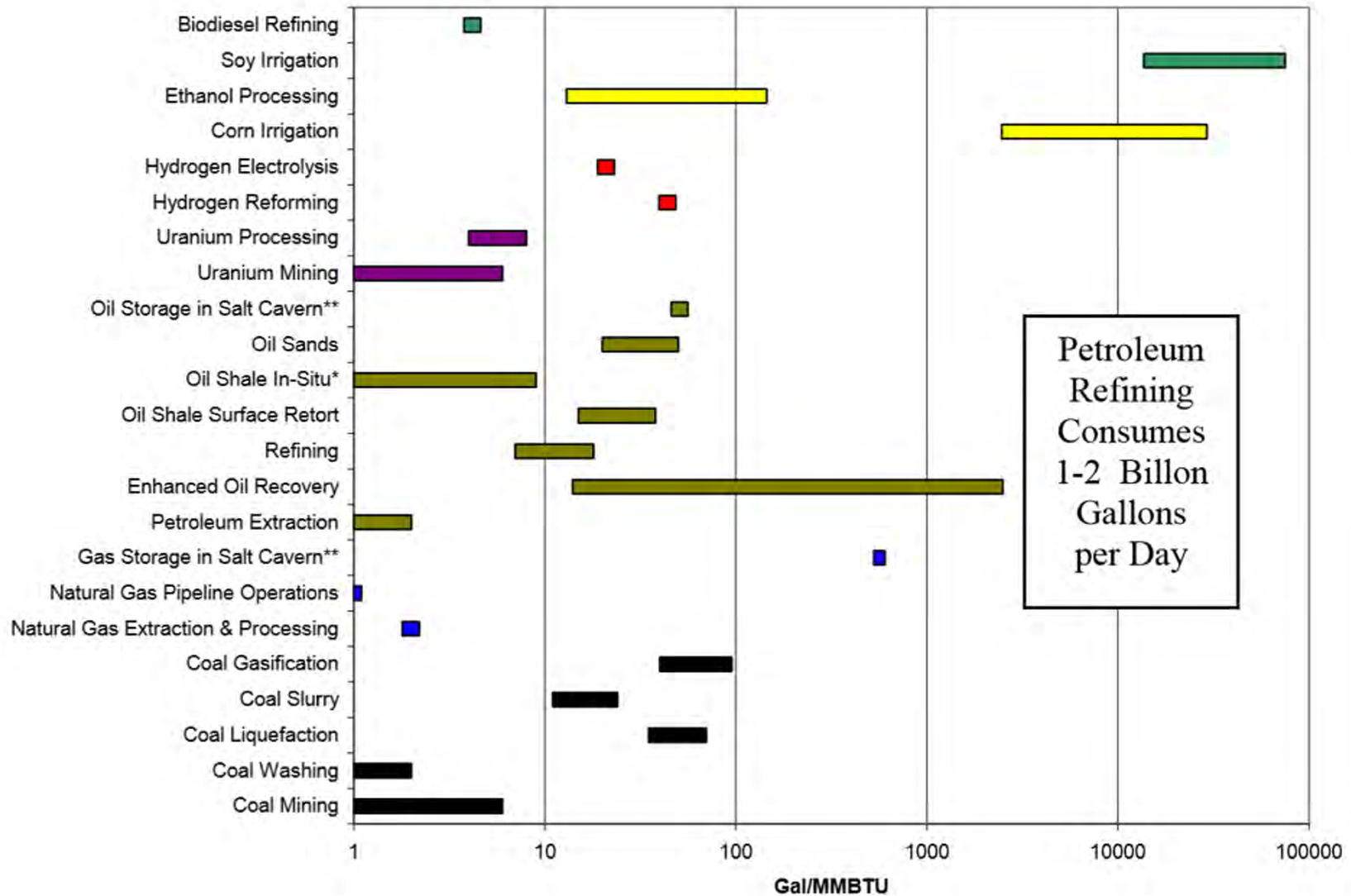


Energy-Water usage

Fuel Source	Efficiency (liters per 1000 kilowatt-hours)
Natural gas	38
Synfuel: coal gasification	144–340
Tar sands	190–490
Oil shale	260–640
Synfuel: Fisher-Tropsch	530–775
Coal	530–2100
Hydrogen	1850–3100
Liquid natural gas	1875
Petroleum/oil-electric sector	15 500–31 200
Fuel ethanol	32 400–375 900
Biodiesel	180 900–969 000

Power Generation Technologies	Efficiency (L/1000 KWh)
Hydroelectric	260
Geothermal	1680
Solar thermal	2970–3500
Fossil fuel thermoelectric	14 200–28 400
Nuclear	31 000–74 900

Water Usage



Water consumption per-unit energy and current water use for fuel extraction processing

Energy-Water Research Roadmap

- Objective:
 - National programs to develop our vast water resources in the energy sector
- In more details:
 - Water Shortages and Impacts on Energy Infrastructure
 - Survey of Likely Water Shortages over the Next Decade
 - Addressing Energy-Water Challenges Bridging the Gaps
 - Collaboration on energy and water resource planning
 - Emerging trends in energy and water natural resource availability and use

Reserve Managements

Data Bank & Reserve Managements

- **Objective**

- Qualify risk and uncertainty through reserves categorization
- Financial and strategic consequences
- Establish uncertainty tolerance levels for reserves categorizations.
- Facilitate and prioritize business decisions
- Develop Energy Strategy

- **Reserve Managements**

- Hydrocarbon reserves tracking and certification
- Current reporting structures and corporate governance trends
- In place and recoverable hydrocarbon
- volumes
- Indications of risk & uncertainty (Upside & Downside)
- Deliverability & Production potential
- Value and cost of future production

Reserve managements

Develop reserve management expertise within the ministry to offset the production decline in the short-term, Establish a Data Bank and help managing the country resources in the long-term.

Moving Forward

1

- Stakeholders input

2

- Volunteer group input & Service companies visits

3

- In-depth reservoir analysis (by consulting company)

4

- Strategy committee group*

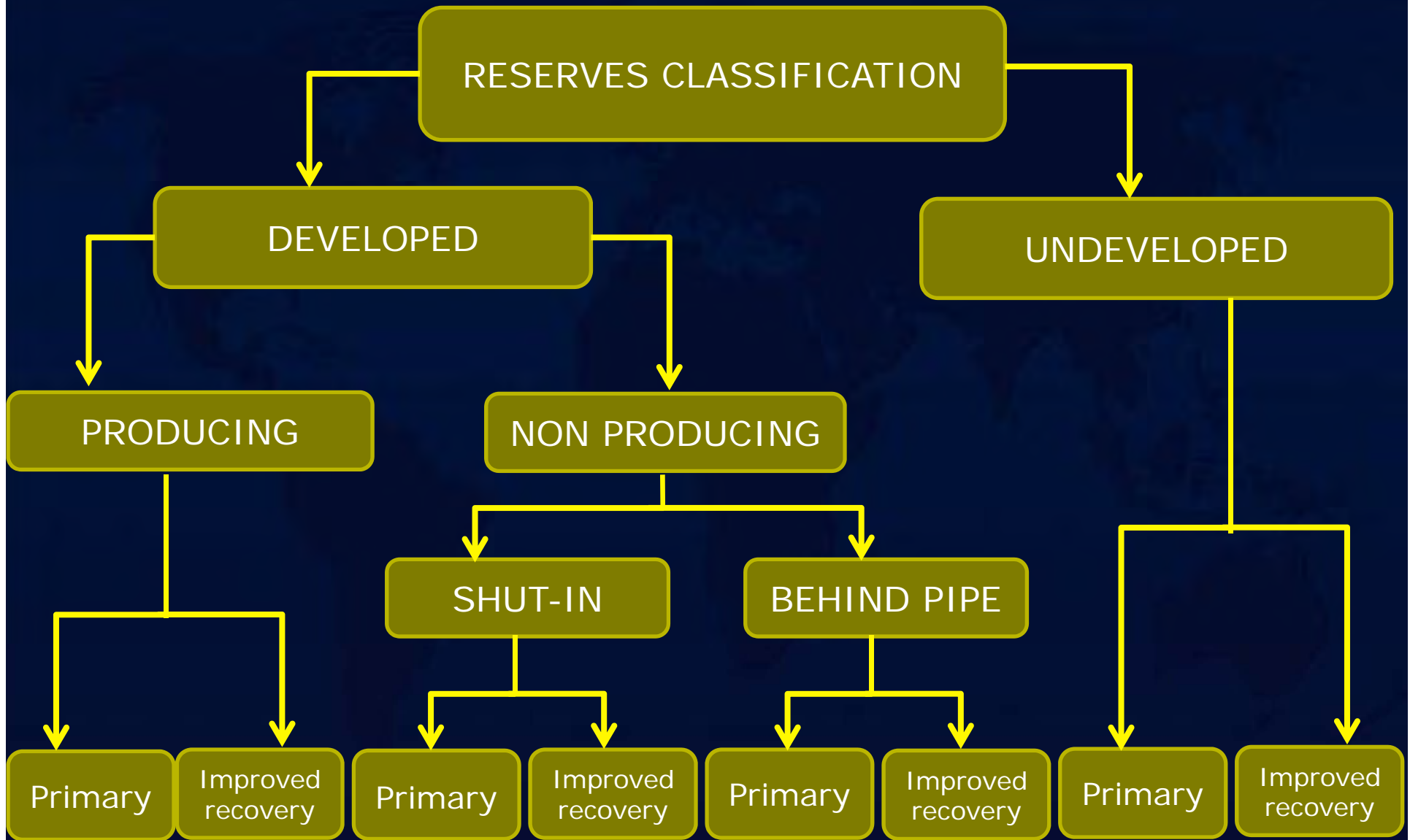
5

- Reservoir training to select a reserve managment group**

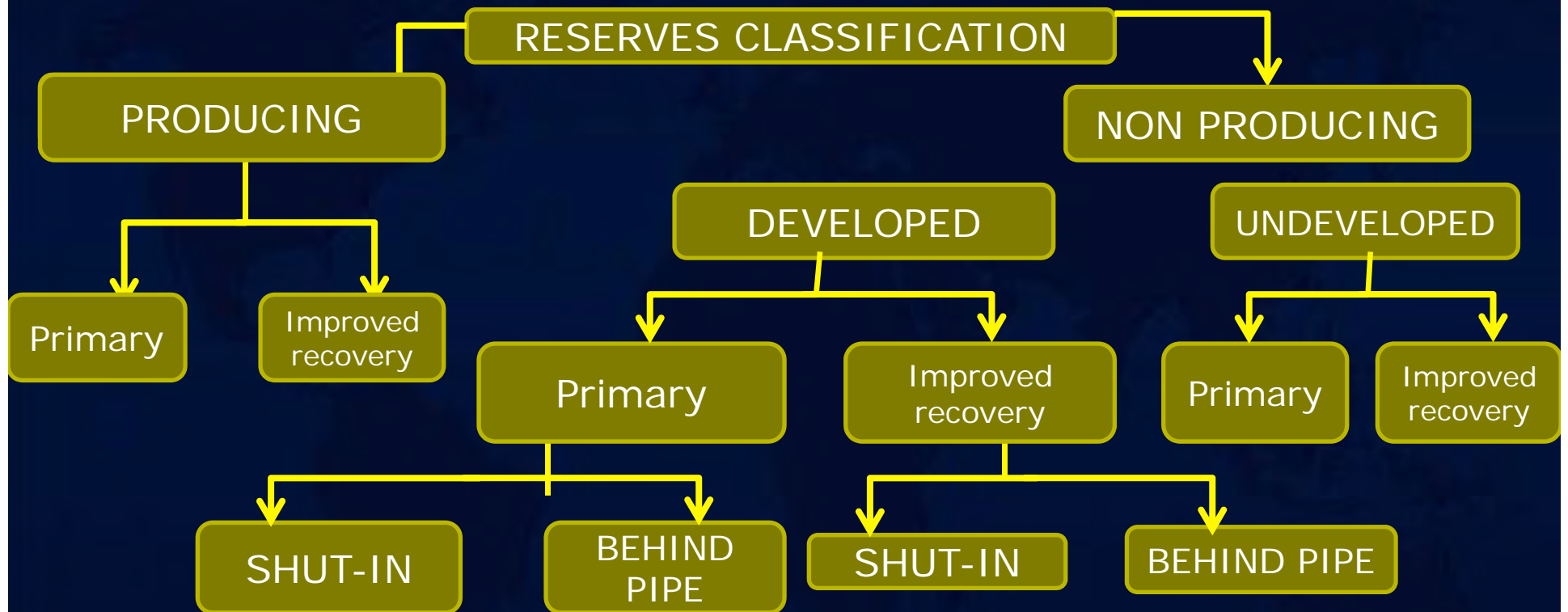
* 15 people will be trained by the consulting company and 5 will be selected to form the Reserve management team.

**External expertise might be acquire for the team

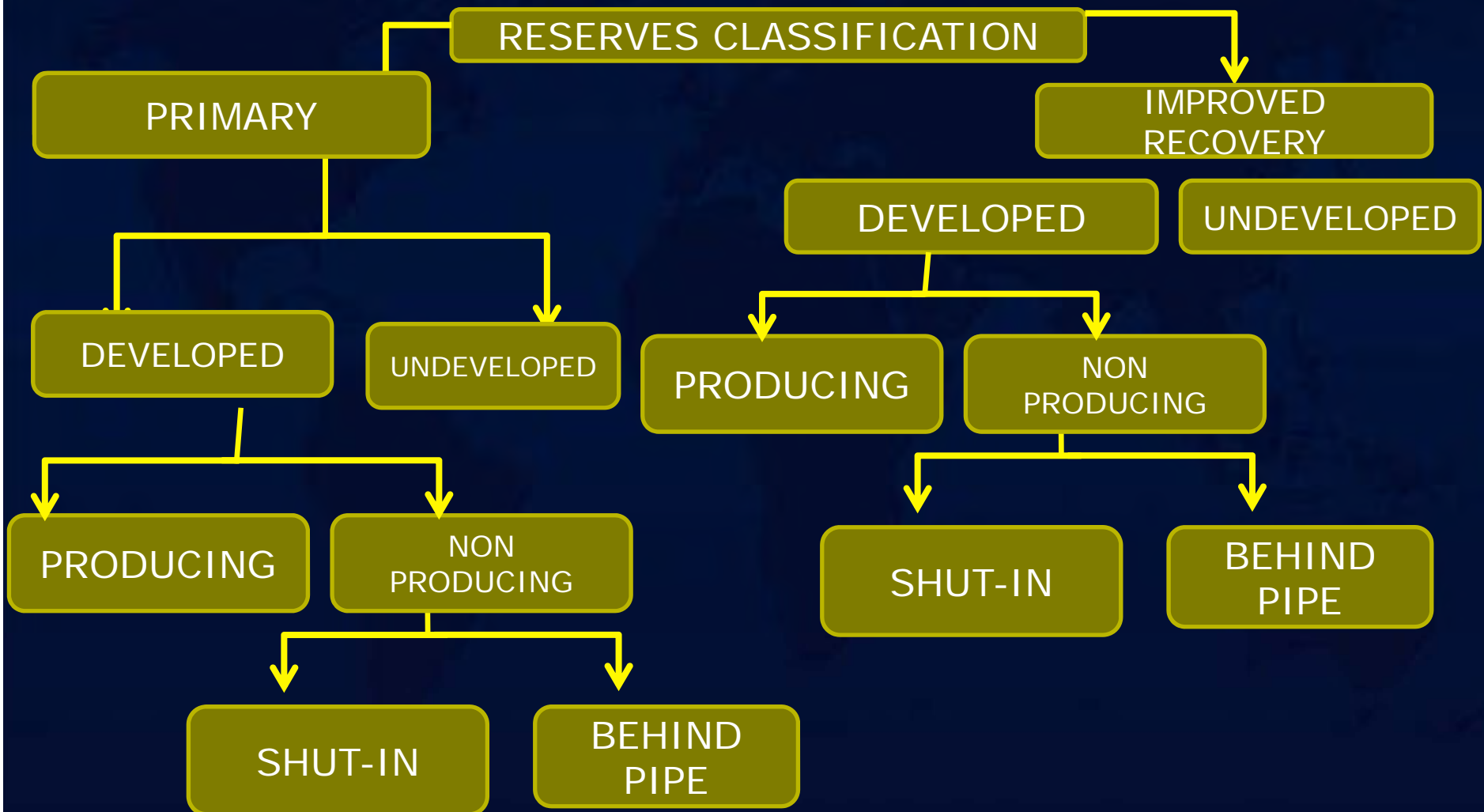
Classification and Status



Resources Classification System



Resources Classification System





International Energy Company

Energy Security: International Energy Company

Intent

Provide energy security for Egypt from the international market and offset the decline in our production

The company will focus on

Create and sustain leadership in a few chosen areas;

Build technical know-how, partner and deliver excellence;

Longer Term Opportunities – create and deliver options for long-term Energy company;

Framework



Energy Security: International Energy Company

Tharwa Co.,

- Egypt Energy International Co.,
- Initial 2000-3000 bpd
- Initial Investments of \$200 m
 - Tharwa 24%
 - Egyptian Investors 74 %
- Joint Collaboration with EGPC
- Evaluate two Scenarios :
 - Start in Iraq directly; Nasria Field in Iraq
 - Acquisition and/or JV in North America initially & then move into Iraq or Africa

Energy Strategy

Develop energy strategy for Egypt

Energy demand is expected to grow, and oil and gas will continue to play a leading role into the future. In addition, the emergence of oil as an asset class has transformed the oil market, which is now far more exposed to the broader financial markets.

We have to develop our energy strategy while carefully considering the interconnection between Energy policy and Economy, and the water resources. Therefore, we will drive our strategy after:

Moving Forward

1

- Get better estimate of our resources

2

- Depth analysis of the reservoirs

3

- Analysis of our future energy needs

4

- Analysis of current, policy, process, commercial, and contracting strategy

What questions need to be consider before developing Egypt energy strategy?

Develop energy strategy for Egypt

Global trends

- What are the global trends that will drive the world's economies and energy demand over the next 20-30 years?
- What structural shifts have taken place in energy demand (global as well as regional) and energy supply patterns over the past few years?

Role of Oil and Gas

- How will we see the role of National Oil Companies evolving in the future? For example, what do we see as the biggest opportunities and challenges for NOCs over the next decade?
- What is the role of oil and gas in meeting future energy demand?
- How do oil and gas investments interact with developments in the world economy – lessons learned from the recent financial crises and the impact of global business cycles?

Business Models

- What new commercial value chains (or partnership models) are formed to connect resources to markets?
- What other structural adjustments (in different regions) are likely to take shape over the next twenty years?
- How are different sectors of the energy industry positioning themselves to address future energy demand?

Develop energy strategy for Egypt

Role of Technology

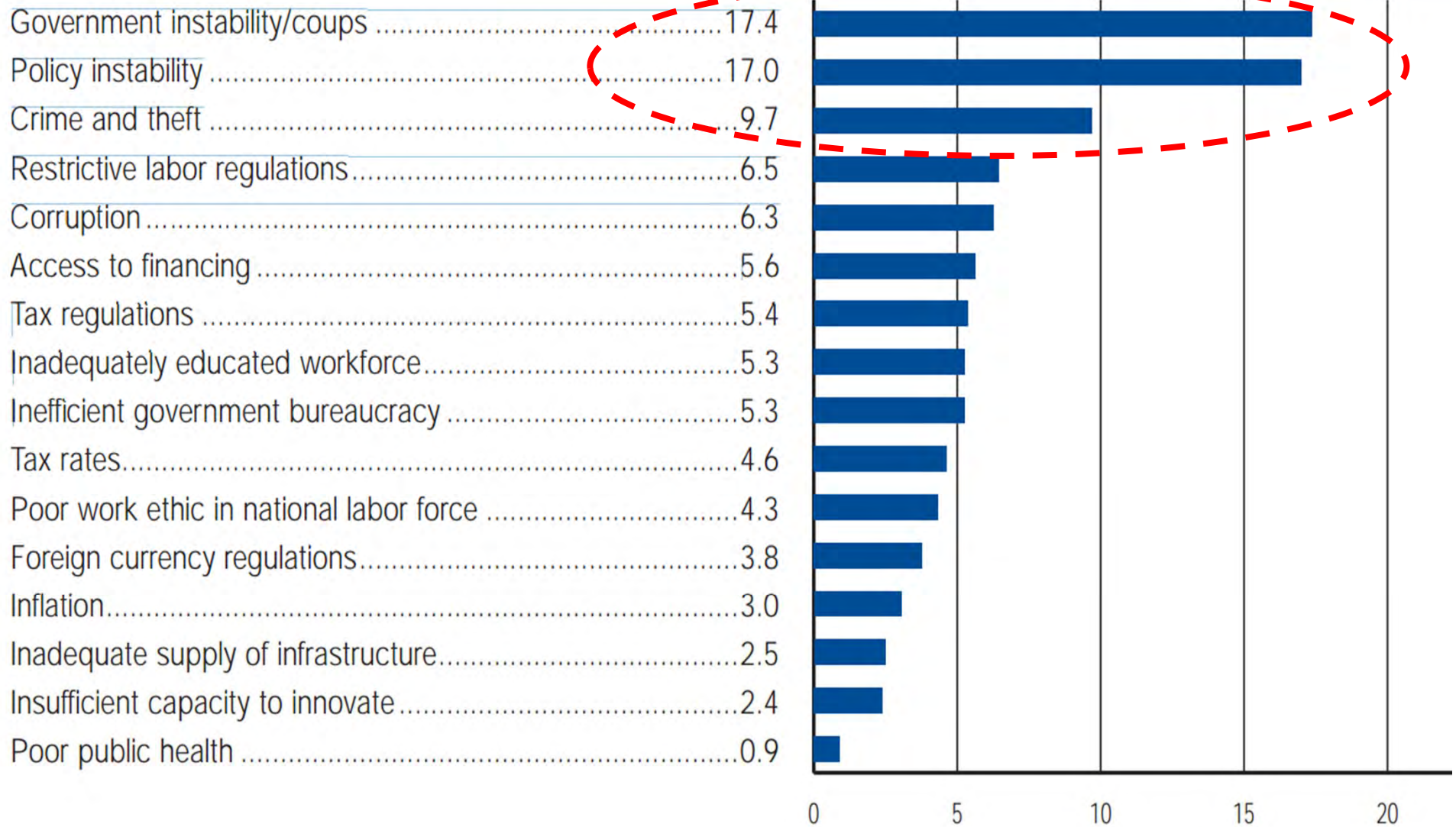
- What role should governments play in enabling energy supply for the future (e.g. Regulation, promoting research and development, etc.)
- Is energy efficiency and supply policies meeting their intended objectives or creating inefficient allocation of capital? How can this be improved?
- What will it take to provide more energy access to the world's masses. (According to IEA estimates, roughly 20 percent of the global population lives without electricity and 40 percent of the population has no access to clean cooking facilities)

Role of Technology

- What are the most promising technology innovations on the horizon for the oil and gas industry?
- What are the most disruptive technology innovations that could affect future demand for oil and gas? What is their time frame?
- The industry has talked about EOR as a major driver of new resources for several decades and there has been considerable investment in these technologies. However, new oil provinces (deep water, shale oil) continue to bring fresh supplies to the market and have pushed out the need for large scale EOR in Middle East giant fields? Is Middle East EOR ever going to be necessary?

Accelerate Investments in the Energy Sector

Most Problematic factors for doing business in Egypt



World Economic Forum

Percent of responses

Accelerate Investments in the Energy Sector

Facilitate interaction between local & foreigner investors and local or national authorities through a single executive person to fast-track decision making

1

- Initial information request

2

- Market analysis and investment opportunities

3

- Visit the market

4

- Contract support & Permit

5

- Post-investment support

- \$5-8 billion within three years and 10,000 new Job
- Upgrade Egypt on international investment rating
- Small size and midsize are essential to fuel the economy
- 150,000 barrel per day in two year
- 1% of companies revenue will go to R&D

What is the right energy mix?

- China energy policy and technology adaptation
- Better understanding of our resources
- Water availability for energy
- Competitiveness of our manufacturing
- Security of supply
- Affordability

We must have an abrupt transition to our current energy mix

Coal, Solar and Wind has to be part of our Energy mix

- Bidirectional meter for the electric grid
- Manufacturing solar system to Egypt
- Up to 20 % of the electric has to come from Coal, wind & solar and the price per kw/h has to be mixed (conventional and renewable)
- Expand solar energy and alter with gas power plant
- New building has to have at least

Review of our energy profiles and potential for Coal, Wind, and Solar Applications ; Investigate Sites

1. Refinery
2. Power plants
3. Petro Stations
4. Headquarter buildings
5. Water plants
6. Wellheads
7. Public usage of electricity
8. Heavy power usage factories

1. Gathering Centers
2. Incentive for power usage
3. Educate the public and young generation about energy efficiency
4. Energy efficient light bauble
5. Public Radio to update traffic every 10 min

Restructuring the Ministry of Petroleum and Mineral Resources MPMR

- Delegating the authority of signing petroleum or Mining agreement (s), after the approval of the Supreme Energy Counsel, to the Minister
- Form the Egyptian Petroleum and Mining Authority by integrating the Mineral Resources
- Establish an Energy Security entity or Establish a Supreme Energy Council planning department
- Allocate 1% of the total energy revenue to inside the country R&D
- The creation of a single regulatory regime that handle regulation, reserve management ,pricing, concessions agreements (**model**, prepare bidding, bidding, award), Technology Transfer, mange the R&D fund, and Geological Survey.

Energy Conference

Establish an Egyptian International Energy Conference

To create a brand for Egypt and channels to send its own message to the world, enhance our relation with our Africa, help upgrading Egypt on international investment rating, attract investors, small and medium size companies, and stimulate the economy, Egypt has to have its own international Energy Conference with a large exhibition.

1

- The Prim minister would sponsor the conference

2

- Initially the ministry of oil might have to support the exhibition

3

- Minister of oil speaks at the conference

4

- Ministry of oil and commerce organize and attends a session every day

5

- Plan key-events, announcements, and meetings around the conference

6

- Plan key-events, announcements, and meetings around the

The governments will not run the conference, but it will facilitate and drive the conference

Conclusion

- To achieve Securing Energy for Egypt
 - **Establish a Data bank and Reserve management Group**
 - **Efficiency; require the creation of new entity**
 - **Develop unconventional resources task force**
 - **Sustain current production taskforce**
 - **Promote Alternative Source of Energy (Coal, wind, and Solar)**
 - **Create an international state company for exploration, development, and production**
 - **Reevaluate our commercial strategy taskforce**
 - **Attracting foreign and local investments**
- Authorizing ta company to make a direct order (s)
- Develop Energy Strategy in conjunction with Water Strategy

Conclusion

- Form the Egyptian Petroleum and Mining Authority by integrating the Mineral Resources
- Establish an Energy Security entity or Establish a Supreme Energy Council planning department
- National programs to develop our water resources
- Allocate 1% of the total energy revenue to inside the country R&D
- The creation of a single regulatory regime that handle Develop energy strategy for Egypt
- Restructuring the Ministry of Petroleum and Mineral Resources MPMR
- Delegating the authority of signing petroleum or Mining agreement (s), after the approval of the Supreme Energy Counsel, to the Minister