The development of a petroleum industry in Cyprus

Learnings from previous experiences

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Third Hyperion Lecture at the University of Cyprus
29 September 2015
Global petroleum context

- Contribution of the Oil & Gas
- Petroleum supply, today and tomorrow
- Strategies of the main players

Needs and challenges

- Differences between oil and gas
- Petroleum game and the different activities
- Skill’s issue

Learnings

- The Dutch disease
- The Oil curse
- The Norwegian example
- The French paradox
What is the global petroleum context?
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World commercial primary energy consumption

Total: 12.9 Gt

Renewables 2%
0.3 Gt
Nuclear & hydro 11%
1.4 Gt

Gas 24%
3.1 Gt

Oil 33%
4.2 Gt

Coal 30%
3.9 Gt

Source: BP Statistical Review
S 121*1bis June 2015
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Source: BP Statistical Review
S 121*1 – June 2015
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Production in LTO basin (Light Tight Oil)

- 2012: 2.3 Mbd
- End 2013: 3.2 Mbd
- March 2015: 5 Mbd

Shale gas basin

- 2013: 276 BM3
- 2015: 400 BM3 (7.3 Mboed)

Source: EIA March 2015

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Unexpected oil price collapse – 2015

"It is not the role of Saudi Arabia, or certain other OPEC Nations to subsidize higher cost producers by ceding market share",
Feb 2015, Ali al-Naimi, KSA Oil Minister
Gas offer/supply - Once upon a time... as seen in 2008 Versus 2014

North America (US, Canada, Mexico)

- **Demand**
  - LNG imports
  - Gas pipe imports
  - Domestic production

<table>
<thead>
<tr>
<th>Year</th>
<th>Bm³</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
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<td>755</td>
<td>737</td>
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<td>2015</td>
<td>103</td>
<td>140</td>
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- **LNG offer/supply**
  - +1.4%/y

Europe* (EU34)

* EU25 + Bulg / Cro / Roum / Turq + Norr/Bos/Mac/Serb/Suis

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<th>Bm³</th>
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<td>2020</td>
<td>780</td>
<td>278</td>
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- **LNG offer/supply**
  - +2.2%/y

Asia (Jap/Cor./Taiw/Chine/Inde/Thailand)

<table>
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<th>2020</th>
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<td>2020</td>
<td>518</td>
<td>81</td>
<td></td>
<td>214</td>
<td>170</td>
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</table>

- **LNG offer/supply**
  - -2.9%/y
  - +5.5%/y
  - +7.9%/y

2008 expectation for 2015

- **North A:** LNG x 6
- **EU 34:** LNG x 3
- **LNG Atlantic** > LNG Asia 6

Reality in 2014 (since 2005)...

- **North America:** Cons +167 Bm³ Prod +198 Bm³
- **EU:** Cons -114 Bm³ Prod -82 Bm³
- **Asia 6:** Cons +231 Bm³ Prod +104 Bm³
- **RoW:** Cons + 333 Bm³ Prod +451 Bm³

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Gas uses

Key
- Total residential and commercial
- Industry
- Transport
- Electricity production

JAPAN
117 Md m³

EU
444 Md m³

US
722 Md m³

Source: G. Charon, Ed Technip, 2014
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Gas markets in 2013 – “Atlantis market”?

Key
- LNG
- Gas pipe

Source: IFP Training 2014
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**Gas resources:**
3400 Gm³ (USG)

**Reserves:**

Aphrodite (Cyprus): 127 Gm³
Leviathan (Israel): 620 Gm³
tamar: 303 Gm³ (in production)

Zohr (Egypt):
Potential of 850 Gm³?
- Fight against depletion
- Develop conventional hydrocarbons
- Develop unconventional resources

Average depletion rate ~3 to 4% (from 3% per year to 5% per year)

Source: BP Stats 2013
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Black swan scenario is not probable…  
... but possible

2002-2014 paradigm

- Oil & gas are rare, demand will continue, price will increase
- Countries increase fiscal terms on production
- Production costs increase (expensive projects)
- Inflation on O&Services
- Dependency increase from OPEC
- Oil exports and oil prices allow to feed the oil demand in exporting countries

BLACK SWAN scenario

- Peak demand at the horizon
- Peak demand before peak oil
- Small independent players travel abroad and spread Shale revolution
- Producers compete and decrease fiscal term to attract investments
- O&G exporters need cash, increase local tax on petroleum products and cut investments
- O&G price is driven back by marginal costs (which are decreasing)

Who is ready to be disruptive?
What does is take to develop such an industry in a new country?
OIL IS LIQUID!

- Easy to handle through interruptible and flexible chain

GAS IS « GASEOUS »!

- Difficult to handle and requires practically non interruptible and rigid chain

Gas gives 1000 times less energy than oil per cubic meter!
Gas commercialization

- Production
  - Flared gas
  - Injected gas
  - Propane
  - Butane
  - C5+

- Treatment

- Main network
  - LNG plant
  - Gas tanker
  - Regas terminal

- Retail network

- Commercial
- Industry
- Energy production
- Petrochemical
- Transport

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Critical decision points along the “conventional” E&P chain

**Critical Decision Point:**
Go into the Permit or not?

**Critical Decision Point:**
Additional development, Yes or No?

**Critical Decision Point:**
Launch development or not?

**Field Development**
- Appraisal
- Development Studies: Preliminary, Conceptual
- Pre-project: Pre-FEED
- Project

**Field Operation**
- **Production profile**
- **End of production**
- Restored site

**Field abandonment**

**Internal Rate of Return (IRR)**
- 1-3 y
- 2-4 y
- 3-6 y
- >20 years

**“First Oil”**

**Development and Investment phases**
- Exploration
- Appraisal
- Development
- Field operation
- Field abandonment

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Oil & gas - Contribution

Direct impacts

Permit
- Expenses or taxes

CAPEX

OPEX

Royalties

Corporate Tax

Production

Induced impacts

Petro, electricity production and industries investments

O&S investments

Competitiveness of businesses

Competitiveness of individuals

- Employees
- Income tax
- Corporate Tax & charges
- VAT

- Employees
- Income tax
- Corporate Tax & charges
- VAT
- Expenses
- Income tax

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What lessons can be learned from previous experiences?
The Dutch disease

That envious reputation which the Dutch economy enjoyed for many years has been losing its shine. Every European country has suffered from the post-Opec recession, but Holland has been particularly badly hit.

Industrial production has not risen at all since 1974. Gross corporate investment has fallen nearly 15%. The share of profits in national income, which averaged 16% between 1965 and 1970, fell to only 5.5% during the same four-year period.

The current account, which showed an annual deficit of $1.5bn between 1967-71, remained strongly in surplus right through the shock of higher oil prices—averaging nearly $2 billion a year between 1975-76.

This contrast—between external health and internal illness—is the symptom of “the Dutch disease”. Since it is widely believed to stem from Holland’s gas facilities, closer attention. The Dutch version has three components, each one of them external.

Strong guilder

1. Too strong a currency. Large quantities of gas were first discovered in 1969, in the halcyon days of sheep oil and the expectation of abundant, safe nuclear energy within 20 years. Understandably, therefore, the Dutch authorities planned to export the gas as quickly as possible. This meant encouraging the domestic use of gas through low prices by 1975. Gas accounted for 58% of Dutch energy consumption. In addition, massive long-term expert contracts were drawn up with prices linked to the oil price, but only after a lag.

The current account benefited accordingly. The gas contributed cannot be precisely measured, but the added weight...

Groningen gas facilities

O&G money resulted in an inflated currency that harmed exports, provoked inflation and led to unemployment and inequality.

Source: The Economist, 1977, upstreamonline
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Risks

- Inflation
- Corruption
- Bad governance
- Easy money for “popular” solution
- Short term strategy
- Pollution

Opportunities

- Finance budget
- Finance education, R&D in energy...
- Finance infrastructures
- Cheaper energy supports competitiveness
- Build long term strategy

Statistical research found that countries that exported raw materials, minerals, agricultural products and fuels tended to grow less than more industrialized countries (J. Sachs and A. Warner, 1995)

This conclusion is not shared by all. There are as many cases of oil revenues being used by autocracies in detriment of the population as cases of oil revenues used in favor of democratic societies (Norway, UK, US, etc.)
Norway’s petroleum/development success

Since 1970’s
$1450 billion (current) created by petroleum industry
$360 billion (current) invested in E&P

Oil production kb/d
Natural Gas production Bcf/d

Agreements NCS
First licensing
Ekofisk discovery
Ekofisk first oil

Petroleum Fund

Today
1st in Human Development Index
“Oil fund”: Bn$ 857, Sept 2014
Petroleum exports: 50% of export earnings
Statoil: $47Bn market capitalisation
Petroleum sector: 25% of GDP, 80 000 employees

Kb/d
Bcf/d
0
2
4
6
8
10
12

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20-30’s  Concession in Middle East (San Remo treaty)

40’s  National gas distribution network development

50’s  Intensification of oil exploration in Africa, especially the Sahara. Development of Lacq

60’s  Start of offshore exploration and production in West Africa, Gabon and the North Sea. Development of liquefied gas transport technologies

70’s  Development of innovative technologies for oil and gas production in the difficult conditions of the North Sea

80’s  Development of energy saving technologies and environmentally friendly products, particularly for downstream operations

90’s  Development of technologies for deep offshore and discoveries of giant fields

2000’s  Development of technologies for LNG, floating LNG, etc.
Provider of technologies, catalysts, adsorbents and services to the refining, petrochemical, gas and alternative fuels industries.

Provider of oil and gas consulting and software solutions

Training and simulation

Other stakes
Excellence is our DNA...

IFP Energies nouvelles is among the top 10 national patent filers and recognized as one of the world's 100 most innovative organizations.

Yves Chauvin, Engineer and Research Director at IFPEN from 1960 to 1995, winner of the Nobel Prize in Chemistry in 2005.

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- Petroleum hydrotreating & hydroconversion,
- FCC gasoline desulfurization
- Catalytic reforming
- Claus and Tail Gas Treatment
- Oil & gas training, etc.