# KIMM - BIRTH - GROWTH - IMPACT

A REVIEW

**HELLMUT SCHMÜCKER**

**former adviser to KIMM**

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# OUTLINE

I. THE POLITICAL SCENE
II. THE ECCONOMIC SITUATION
III. THE KOREAN – GERMAN DEAL
IV. THE START IN CHANG – WON
V. CHANGES IN THE R&D SCENE
VI. CHALLENGES
VII. STRATEGIC FIELDS

# THE POLITICAL SCENE

In 1975 the Vietnam war ended.
320.000 Korean soldiers had fought.
$240 Mill were transfered for compensation.
Korea´s GNP had grown six fold in 10 years.

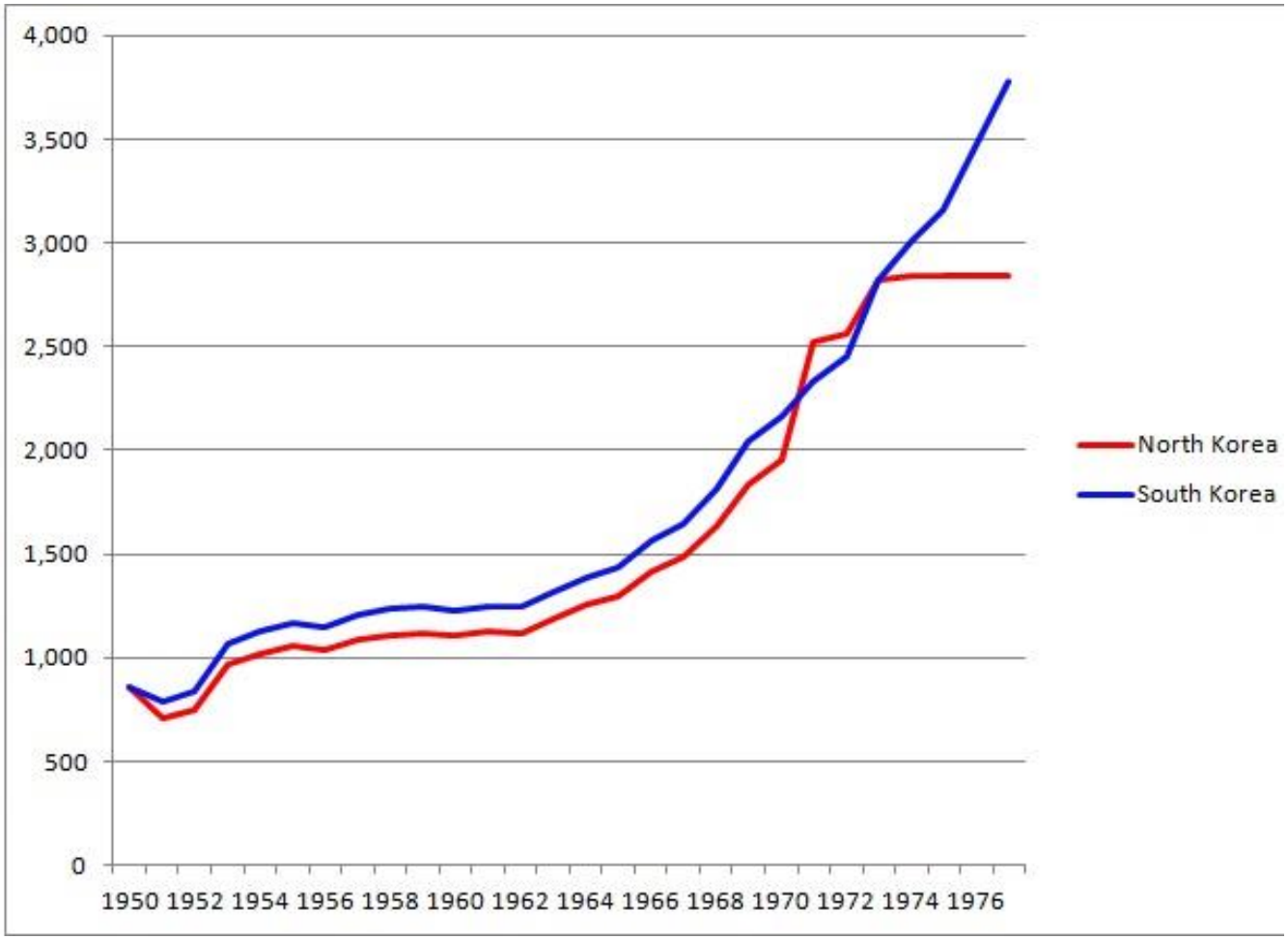
# THE POLITICAL SCENE

- PARK Chung Hee
- *1917 – +1979
- ruled the country since 1961.
- Since 1972 (YUSHIN) by martial law.
- He feared a new invasion from the North.
- He believed in self-reliance and power.
- He thought a developed country is a strong country.

# POLITICAL SITUATION

- Foreign Aid programs poured US$12 Bill. into the country between 1945 and 1990
- Park C.-H. established the economic panning board (EPB)
- The EPB implemented five year development plans since 1962
- The GNP increased by 10% per period
- Food self-sufficiency was achieved

# ECONOMIC SITUATION




GDP per capita of ROK surpasses the DPRK in 1974

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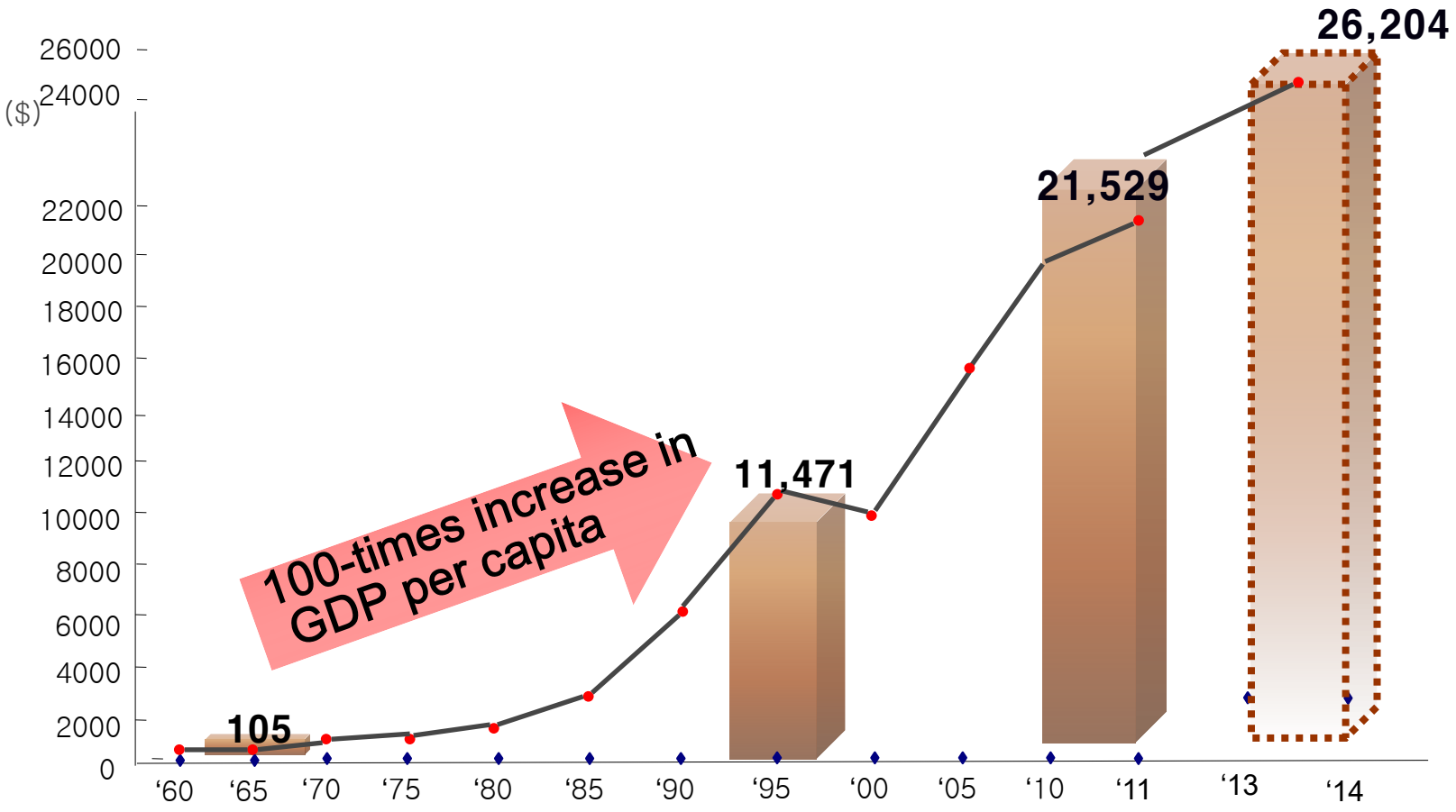
# GDP PER CAPITA SINCE 1960S




1965-1995: 100-times increase in GDP per capita only in 30 years.

# GEOPOLITICAL FACTS

- The industry is concentrated in the Seoul - Inchon area, one hour away from DMZ!
- The Heavy-Chemical- Industry (HCI) - Program started in 1973 (Ulsan, Chang-won, Gumi…….)
- Living standard in the countryside was poor. Park C.-H. started *saemaul undong* (new village program) 1971

# REVIVAL OF R&D

MOST concentrate R&D in

- DAEDOK SCIENCE TOWN (DST) 1974
- Korea Standard Institute
- Korea Shipbuilding Institute
- Korea Electronics Research Institute
- Korea Chemical Institute
- Many more…….all together 27 !

# THE KOREAN – GERMAN DEAL

- 1976 a contract was signed under the foreign aid program with MCI
- Supply of scientific instrumentation
- Vocational training of qualified personel in Korea and Germany,
- Local coordinator and avisor to the president,
- Site, building, and personal by ROK.

# THE KOREAN – GERMAN COOPERATION

Norbert Weber
1870 – 1956,
Missionary in Seoul and Tokwon since 1913

# THE KOREAN – GERMAN COOPERATION

Vocational Training 1925

# MISSION OF KIMM

- Establish a Machinery and Metal testing Institute (KIMM) in the Chang won area,
- Offer testing and quality enhancing services to local industry,
- Help to increase quality level to international standards,
- foster competitiveness of Korean products.

# KIMM´S FIRST PRESIDENT

Prof. Dr. Cho Sun Wi
Seoul National University

1989 in München

# THE START AND OTHER HAPPENINGS

- 1977 KIMM opened offices in Yoido,
- groundbreacking in Chang won
- First high raising appartments accross the Han river were build
- „Miracle of the Han River“
- GNP per Capita passes US$ 1.500

# ADVERTISING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# GROUND BREAKING

# PEOPLE IN CHARGE

# PROGRESS

# PROGRESS

MAIN BUILDING

# PROGRESS

CASINO

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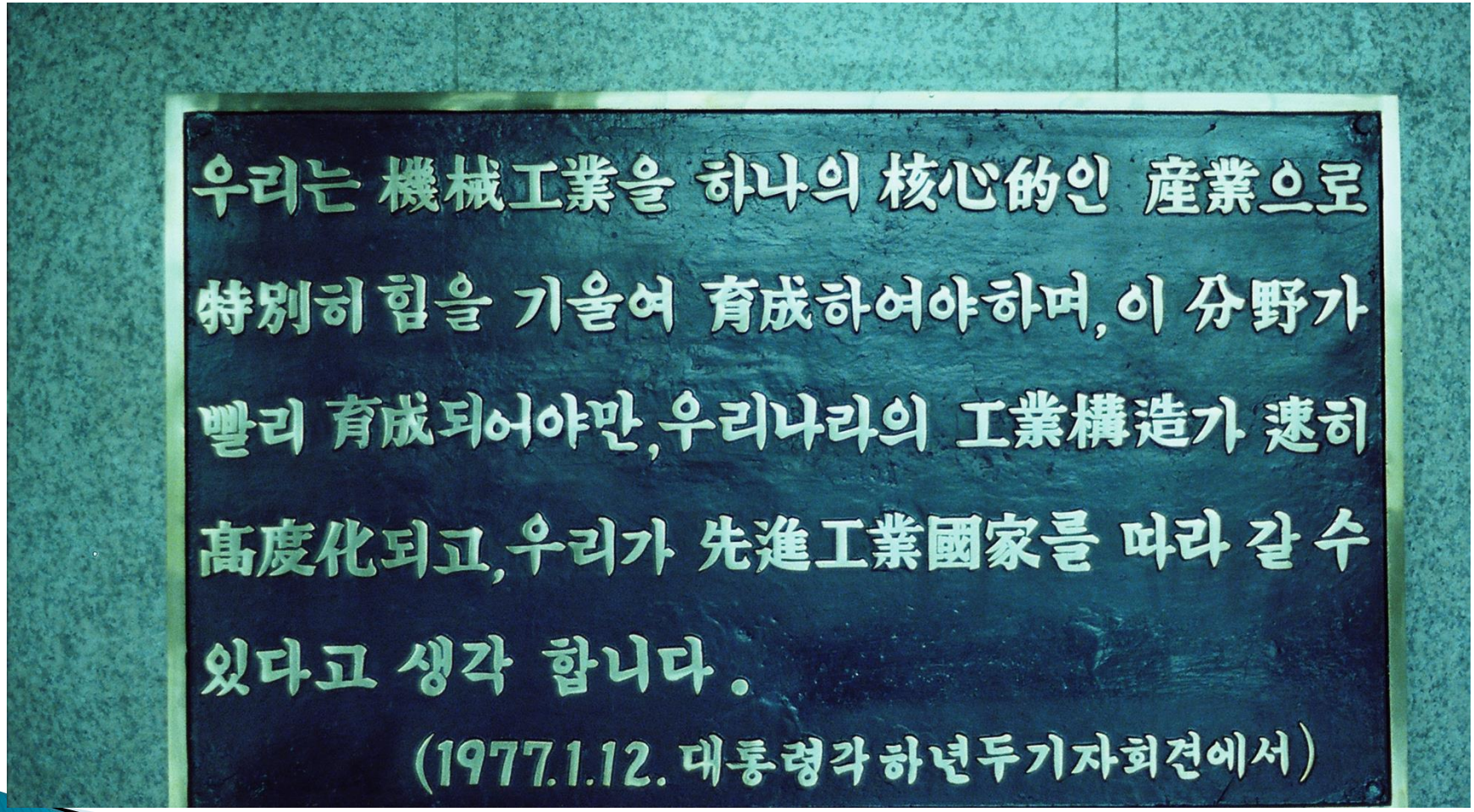
# PROGRESS


LEE CHUN HWAN

2nd President KIMM

# COMPLETION

# COMPLETION


우리는 機械工業을 하나의 核心的인 産業으로
特別히 힘을 기울여 育成하여야하며, 이 分野가
빨리 育成되어야만, 우리나라의 工業構造가 速히
高度化되고, 우리가 先進工業國家를 따라 갈 수
있다고 생각 합니다.
(1977.1.12. 대통령각하년두기자회견에서)

# INAUGURATION

LEE CHUN HWA

Dr. LEUTERITZ
Ambass. to ROK

H. SCHMÜCKER

# INAUGURATION

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National Treasure of Korea No.29

# INAUGURATION

KIMM´s EMILE BELL

# CHANGES IN THE R&D SCENE

Establishment of KAIST (by MOST)
of KAITECH (by MTI)
of MOC and others

The private sector became an equal partner of the Gov. on S&T during the 80ies.

# CHANGES IN THE R&D SCENE

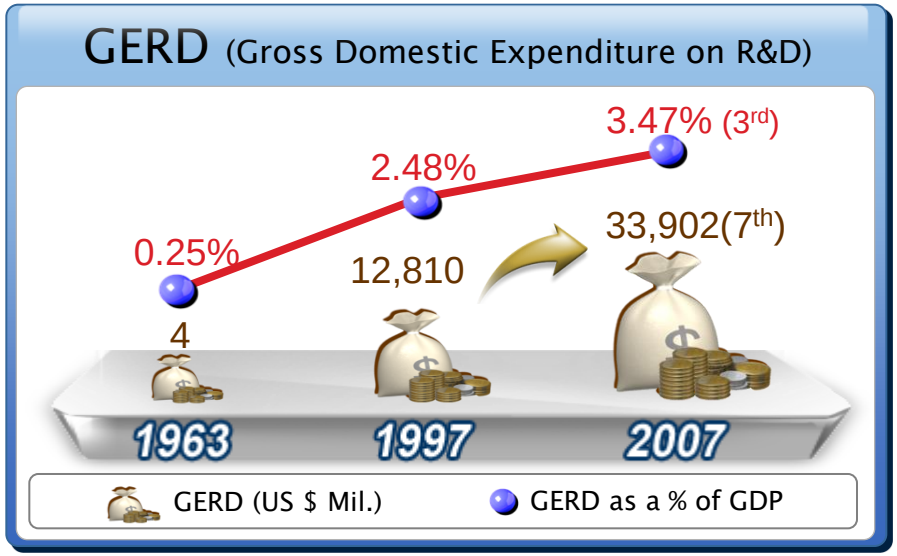
1980: 321 companies had R&D capabilities
1988: 1600 companies had R&D units
or even their own institutes (674).
Companies became independent of foreign technology supplier.
Government spending´s up 4 times to $1.66 Mill.
Private spending´s up **19 times to $28 Mill**.

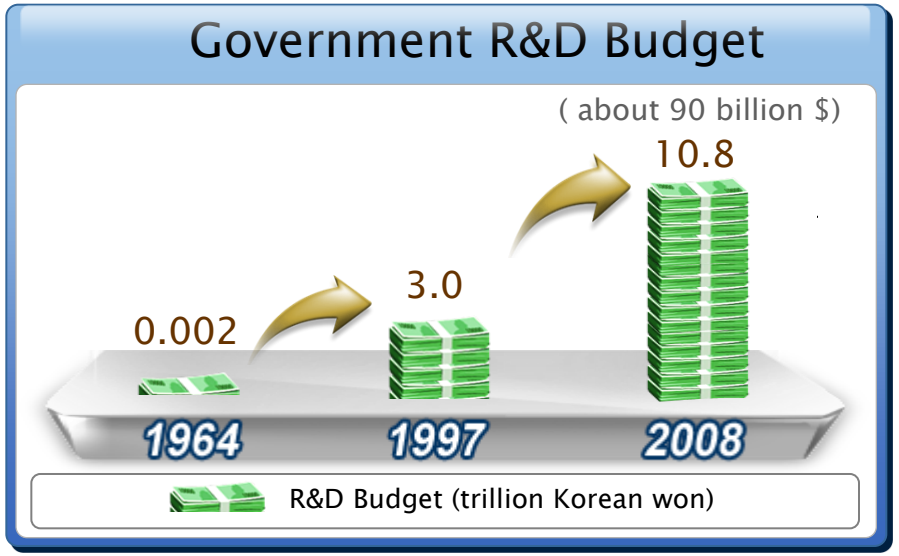
# CHANGES IN THE R&D SCENE

The *Chaebol* matured, the private sector began to take the lead.

(1) Competition between MOST and MIT was vigorous and cut efficiency
(2) Companies had sufficient earnings to establish their own R&D departments.
(3) Establishment of KIRI in 1979

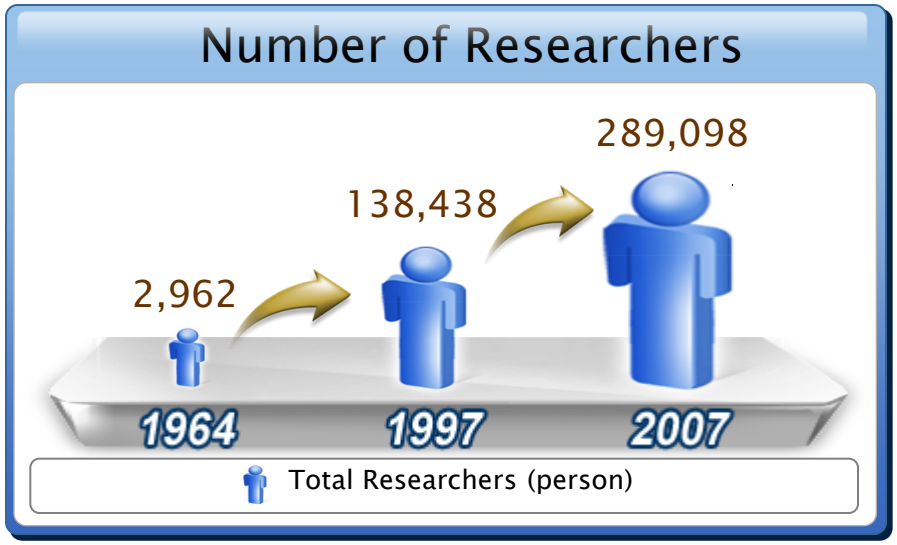
# CHANGES IN THE R&D SCENE
## R&D INVESTMENT

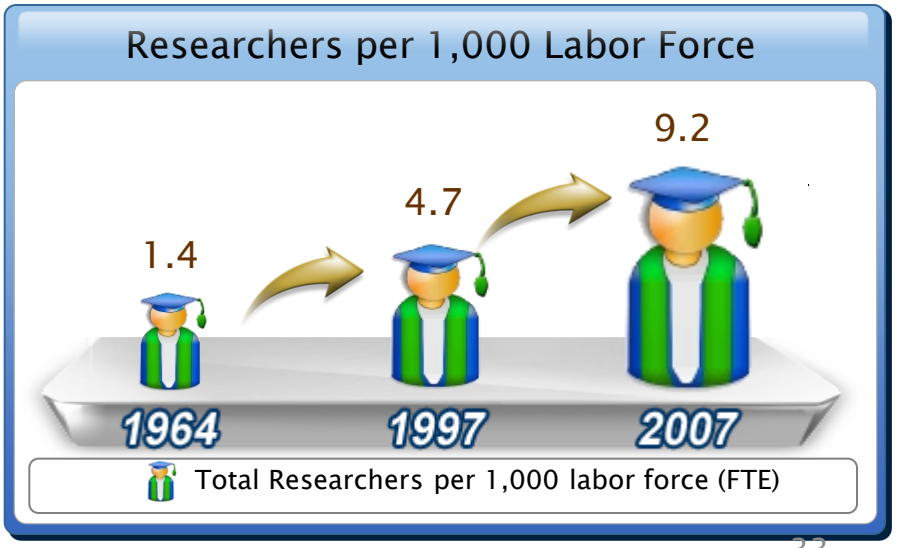



Source: Ministry of Education, Science and Technology (2009)

# CHANGES IN THE R&D SCENE
## Human Resources






Source: Ministry of Education, Science and Technology (2009)

# S&T POLICY AND RESULTS

(1) TDX – project: partner MOC, KTA, ETRI, DACOM on the **public** side

GSS, OTC, SEC, HEC, DTC on the **private** side

>>> provided Korea with the most advanced telecommunication system in the east.

# OVERSEAS COMMUNICATION

By recommendation of KARC

and permission of KCIA

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# S&T POLICY AND RESULTS

(2) COMPUTERS:

MOC, MOST, MTI with KAITECH, KIET (Gumi), ETRI, EIAK, KCRA on the **public** side

GSS, SEC, OTC, Cheil, Taihan, TriGem, HEI on the **private** side

>>> limited succes (TICOM-1)

# S&T POLICY AND RESULTS

(3) SEMICONDUCTORS
loans and guidance from MTI, MOC, MOST, ETRI on the public side,

SAMSUNG (SEC), LG, GSS, HEI, DTC on the private side,

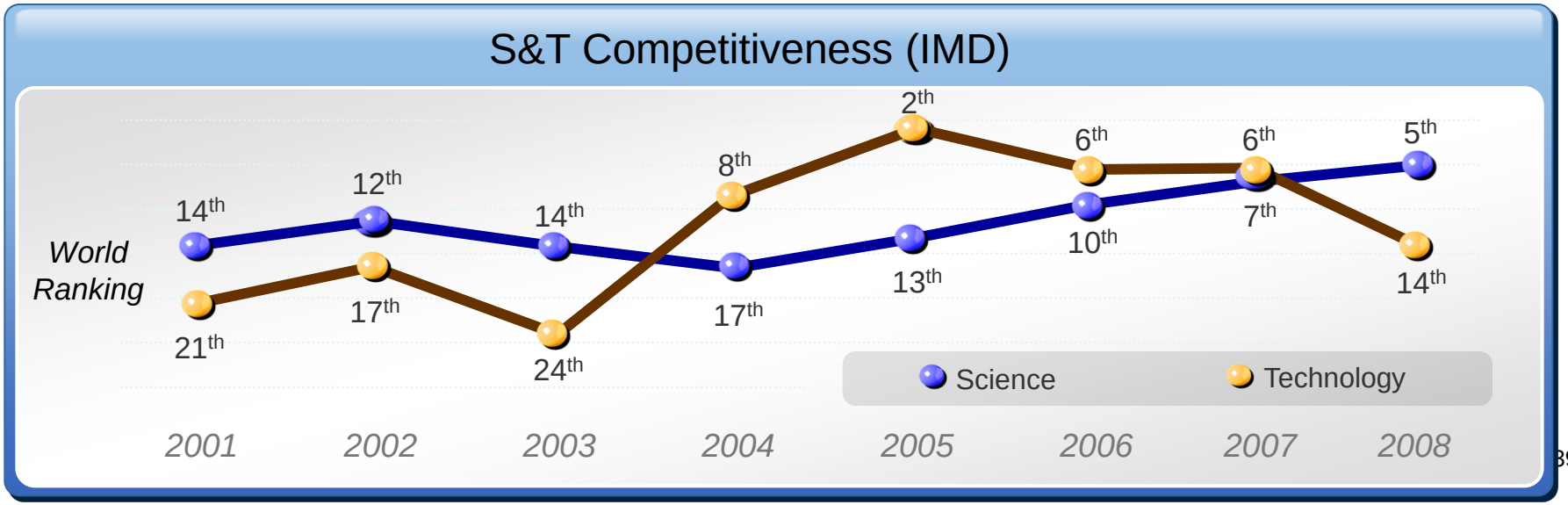
>>> full succes

# S&T POLICY AND RESULTS
# SEMICONDUCTOR

| | | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|
| Global | Output | 44,193 | 67,408 | 58,707 | 52,959 | 65,459 |
| Korea | Output | 20,330 | 33,598 | 30,404 | 27,618 | 34,297 |
| | Market share | 46.0% | 49.8% | 51.8% | 52.1% | 52.4% |
| U.S. | Output | 8,005 | 12,920 | 11,600 | 10,475 | 17,730 |
| | Market share | 18.1% | 19.2% | 19.8% | 19.8% | 27.1% |
| Japan | Output | 9,270 | 14,026 | 11,565 | 10,420 | 8,754 |
| | Market share | 21.0% | 20.8% | 19.7% | 19.7% | 13.4% |
| Taiwan | Output | 3,899 | 6,108 | 4,315 | 3,621 | 3,956 |
| | Market share | 8.8% | 9.1% | 7.4% | 6.8% | 6.0% |
| Europe | Output | 2,642 | 674 | 700 | 625 | 542 |
| | Market share | 6.0% | 1.0% | 1.2% | 1.2% | 0.8% |

The overall rank and output of the world memory market in Bill. US$
( Ministry of Trade, Industry and Energy)

# GROWTH OF R&D AND PERFORMANCE

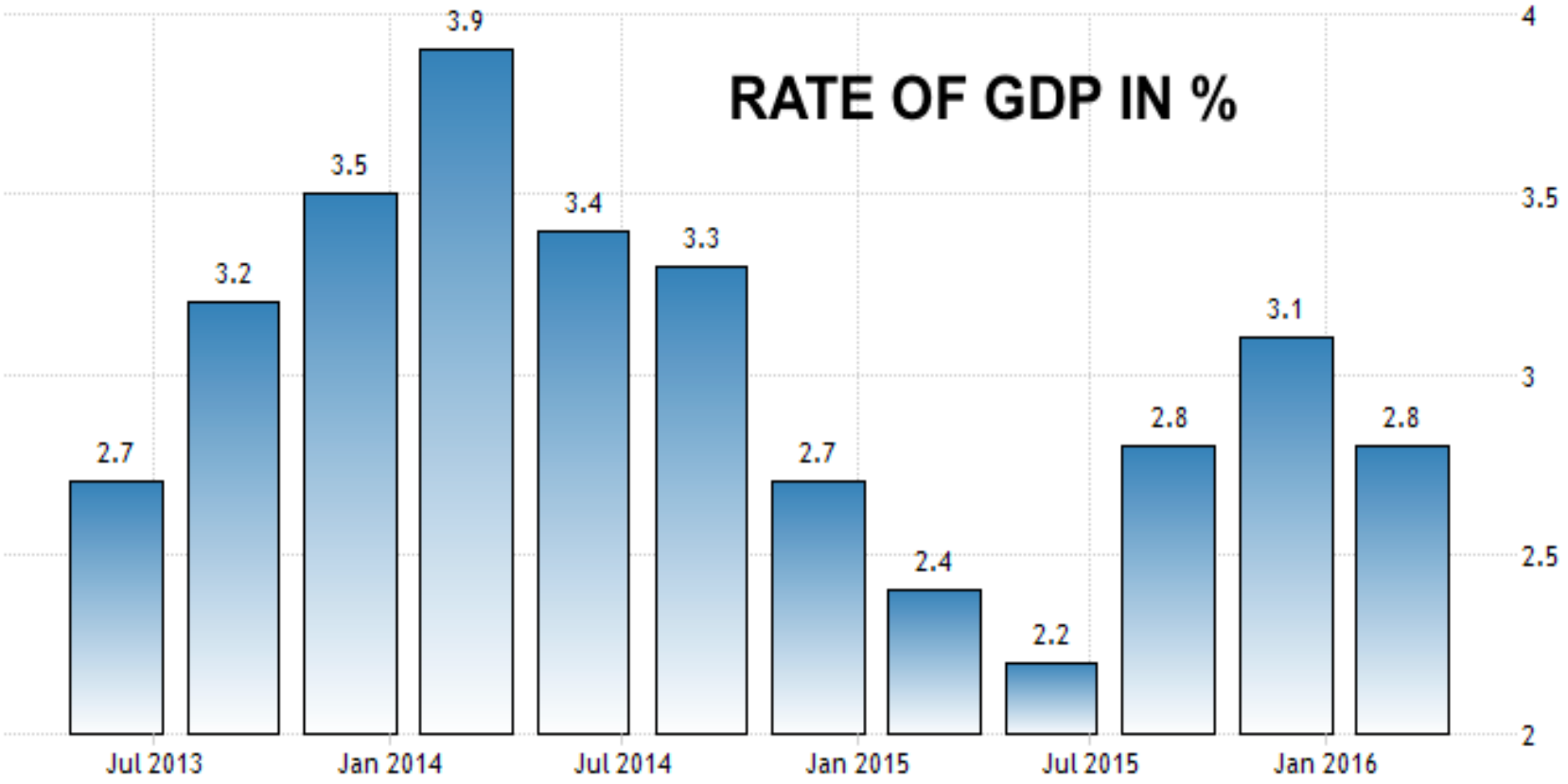



Source: Ministry of Education, Science and Technology (2009)

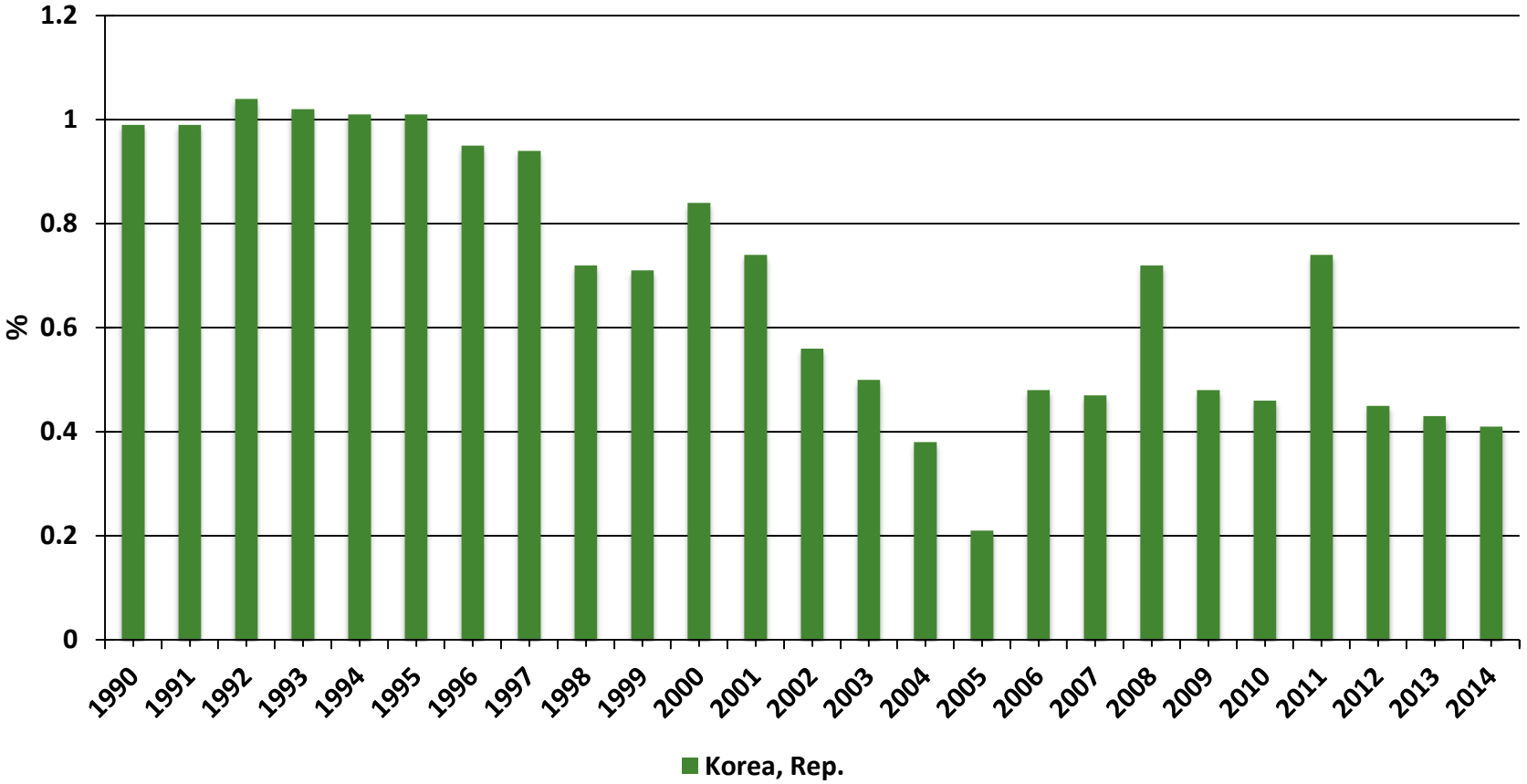
# THREADS TO GROTH:

(1) MANPOWER / LABOR FORCE
(2) STRUCTURE & COMPETITION
(3) ENERGY / RESOURCES
(4) POLITICAL ISSUES

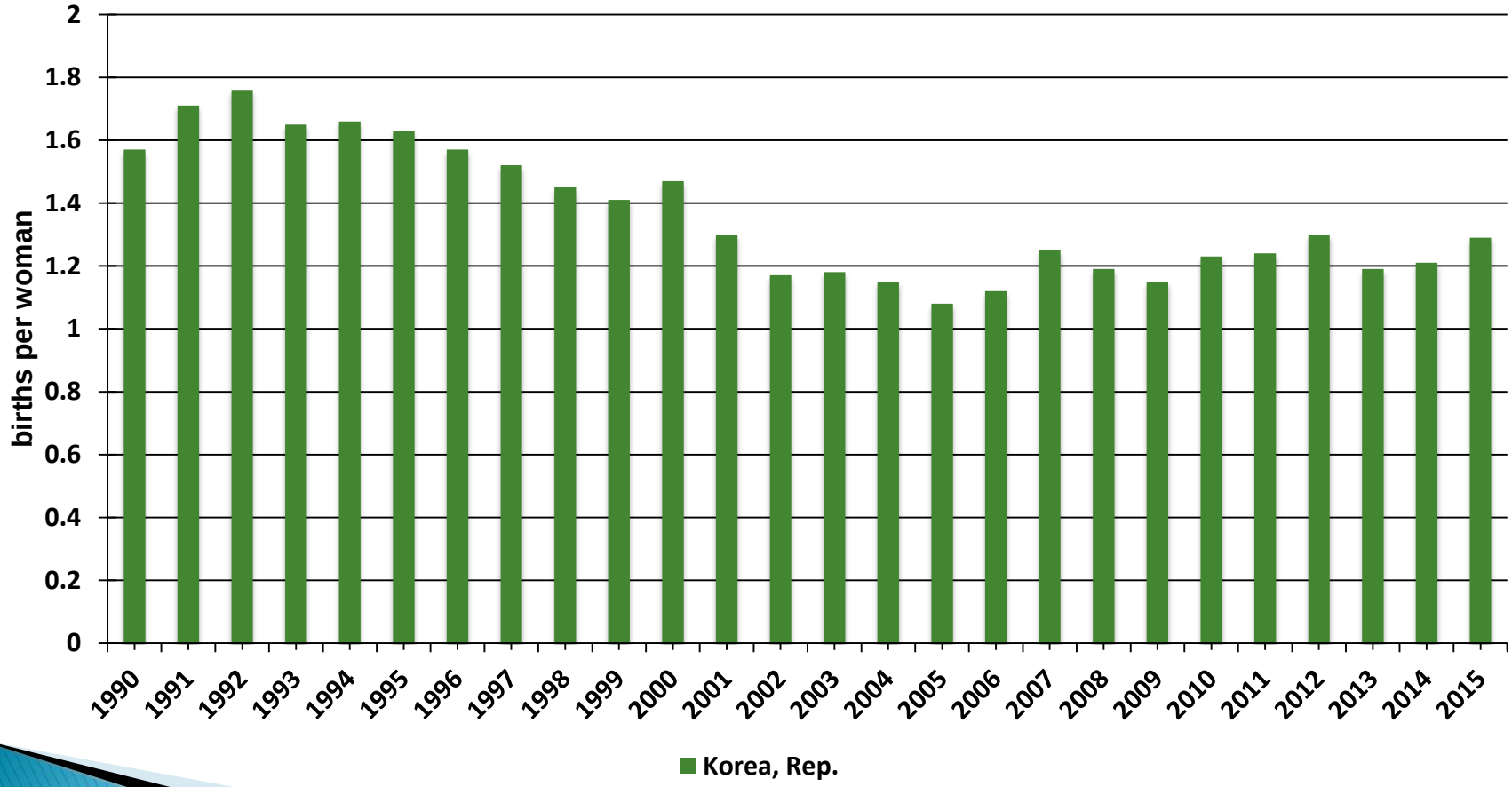
# GDP per capita growth (annual %)



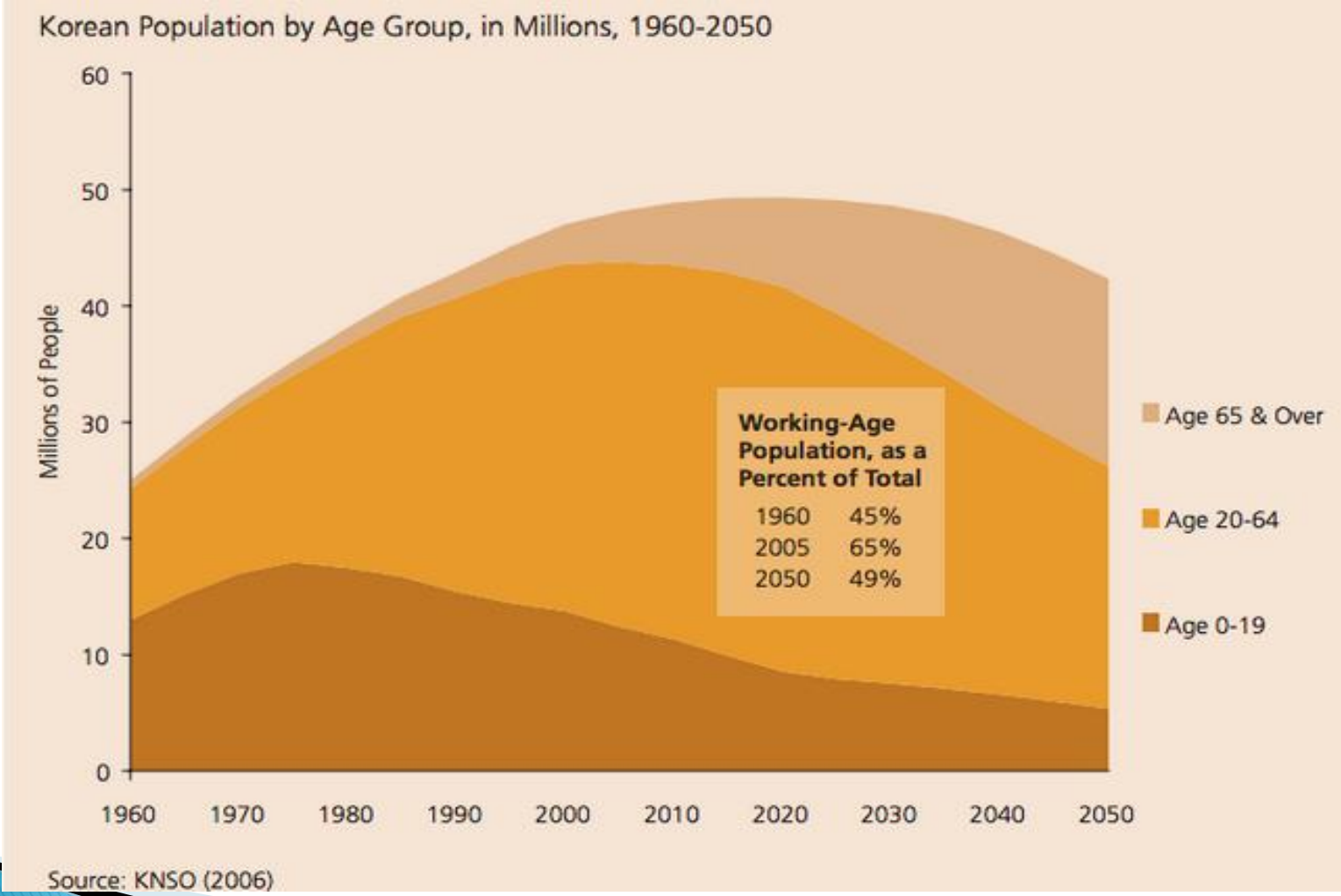
# (1) MANPOWER / LABOR FORCE
## Population growth (annual %)



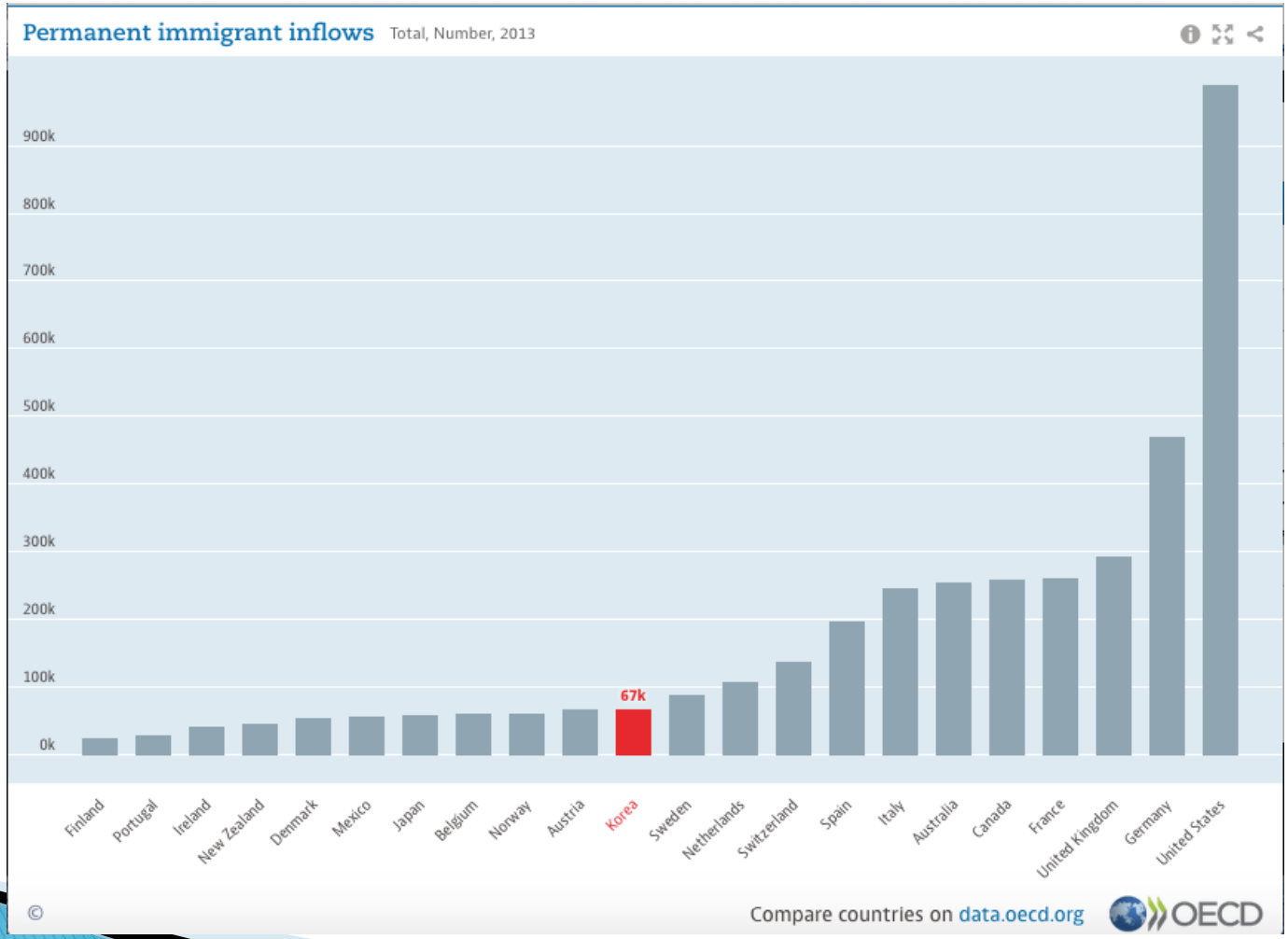
# (1) MANPOWER / LABOR FORCE
## Fertility rate, total (births per woman)



# (1) MANPOWER / LABOR FORCE POPULATION



# (1) MANPOWER / LABOR FORCE
## IMMIGRATION INFLOW

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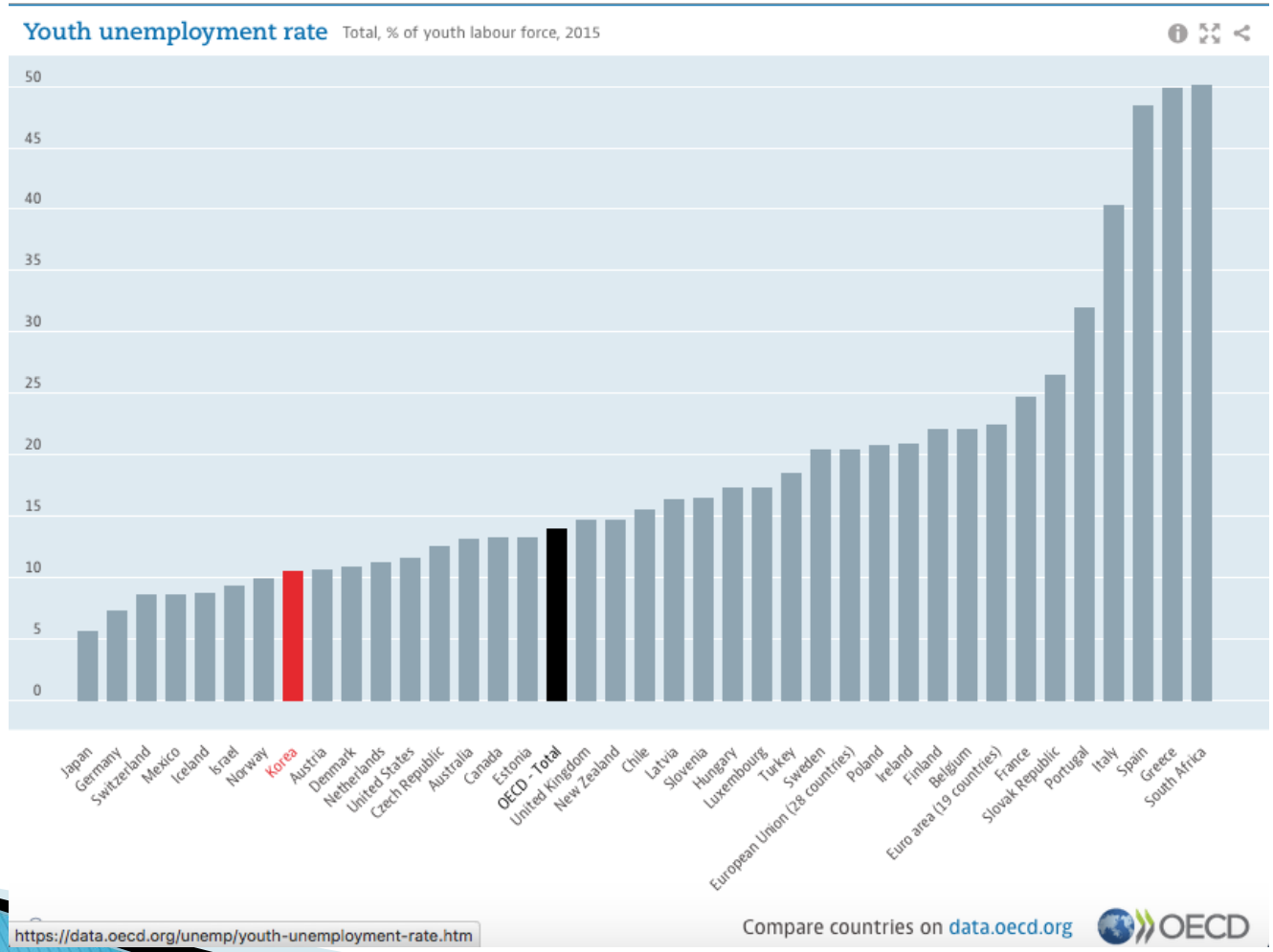
# (1)MANPOWER / LABOR FORCE

## YOUTH UNEMPLOYMENT RATE



# (1)MANPOWER / LABOR FORCE


| Aktuell | Zuletzt | Höchste | Unterste | Termine | Einheit | Häufigkeit | |
|---|---|---|---|---|---|---|---|
| 9.70 | 10.90 | 13.40 | 3.80 | 1982 - 2016 | Percent | Monatlich | NSA |

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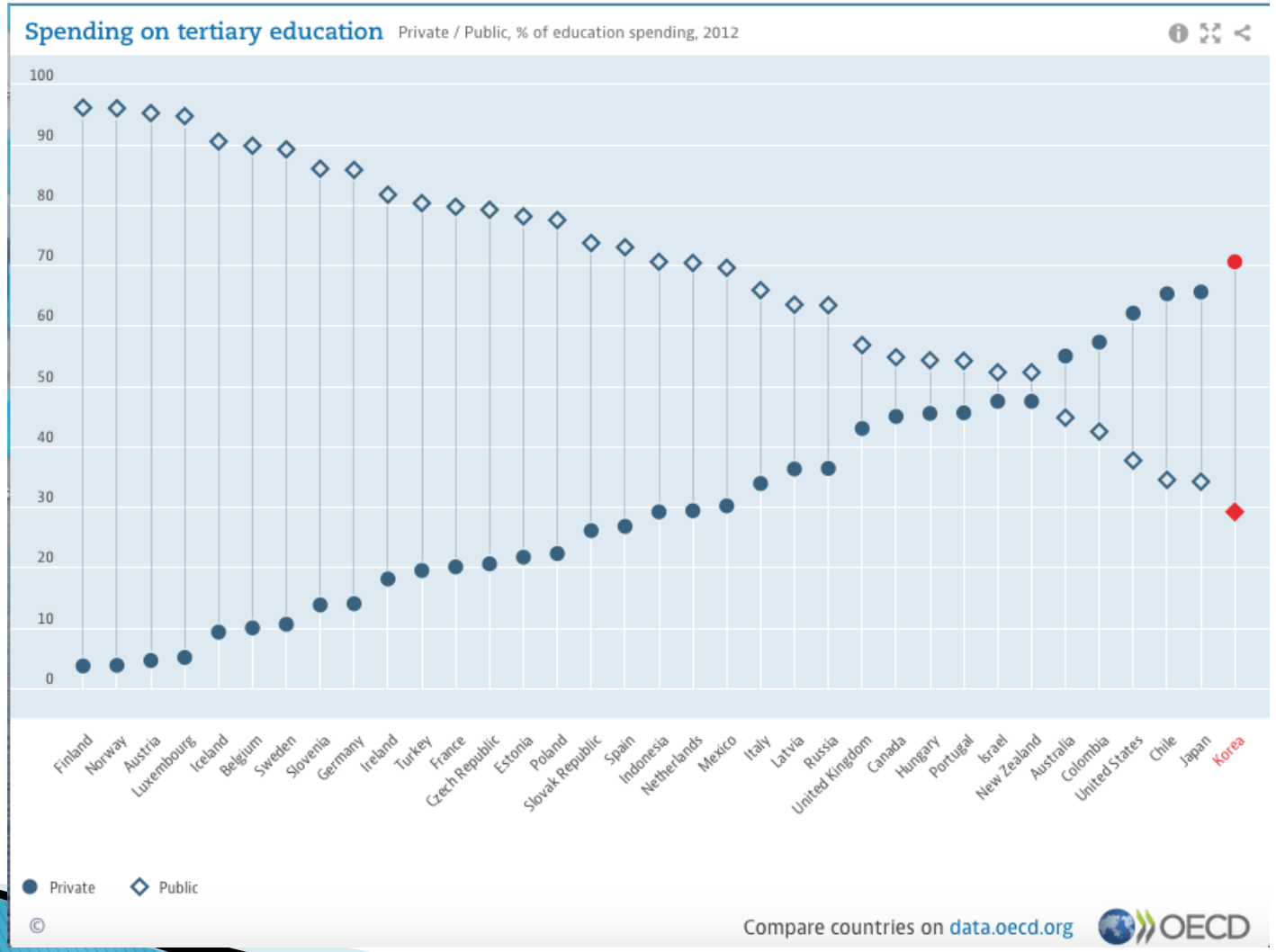
# (1)MANPOWER / LABOR FORCE

# SPENDING ON TERTIARY EDUCATION

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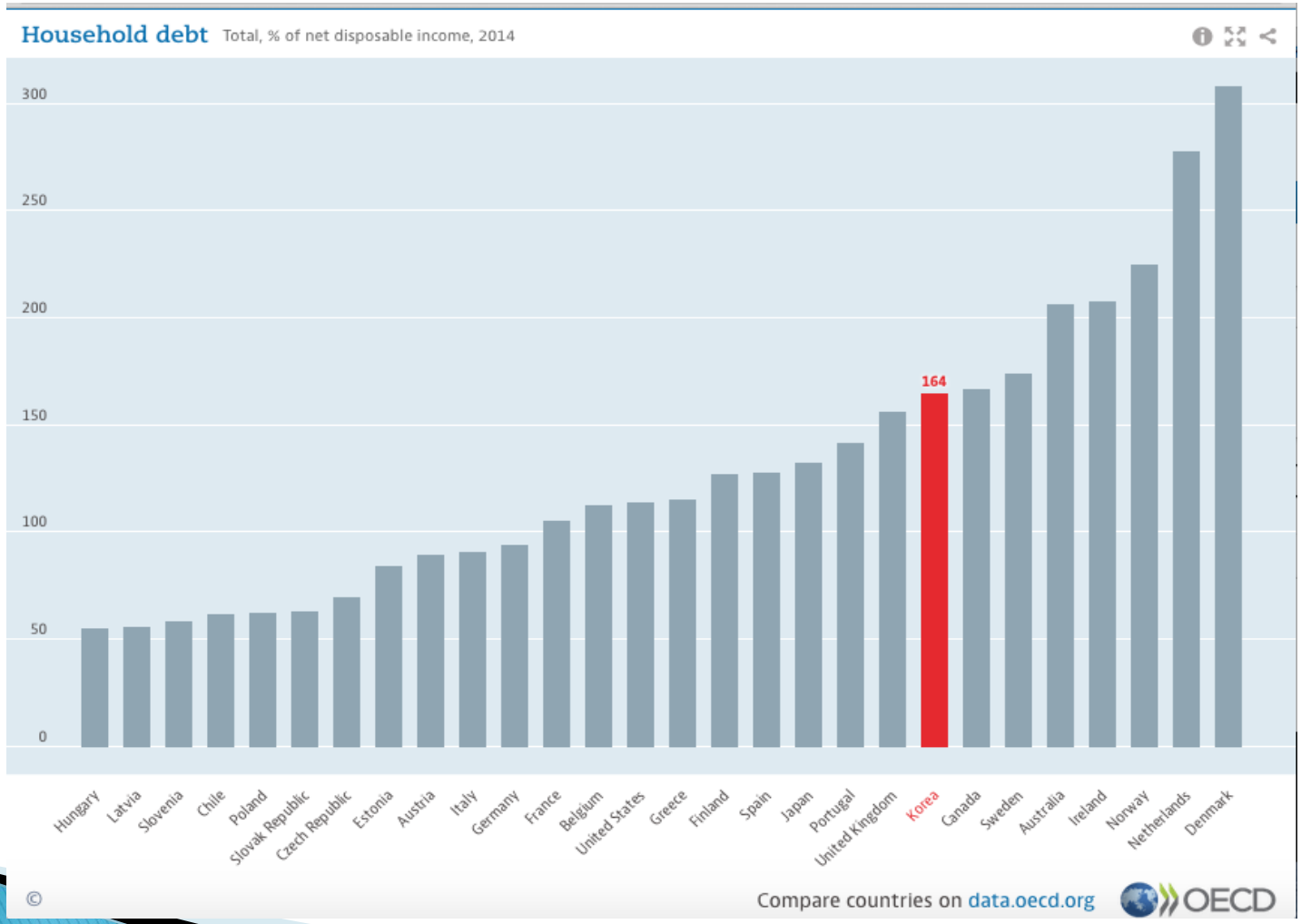
# (1) MANPOWER / LABOR FORCE HOUSEHOLD DEPTH

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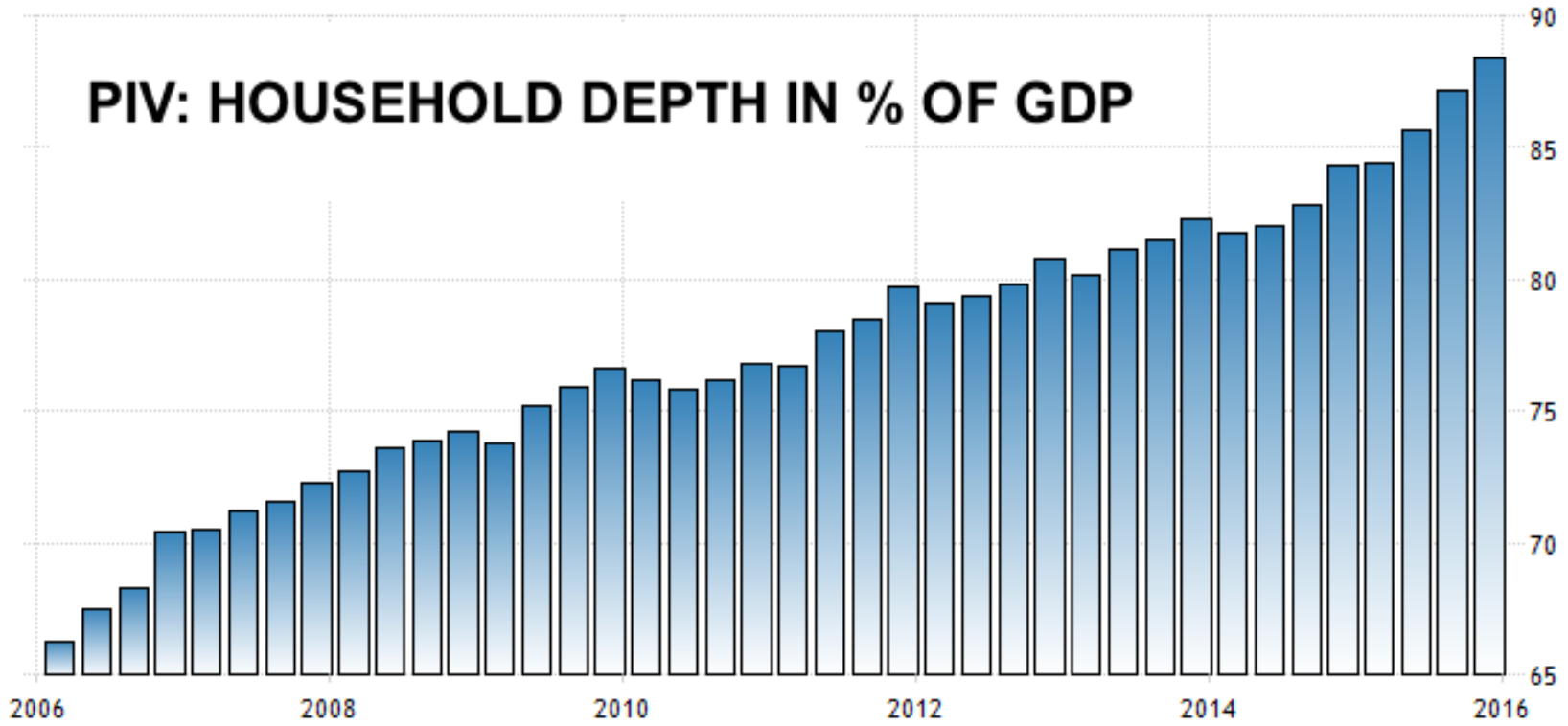
# (1) MANPOWER / LABOR FORCE HOUSEHOLD DEPTH

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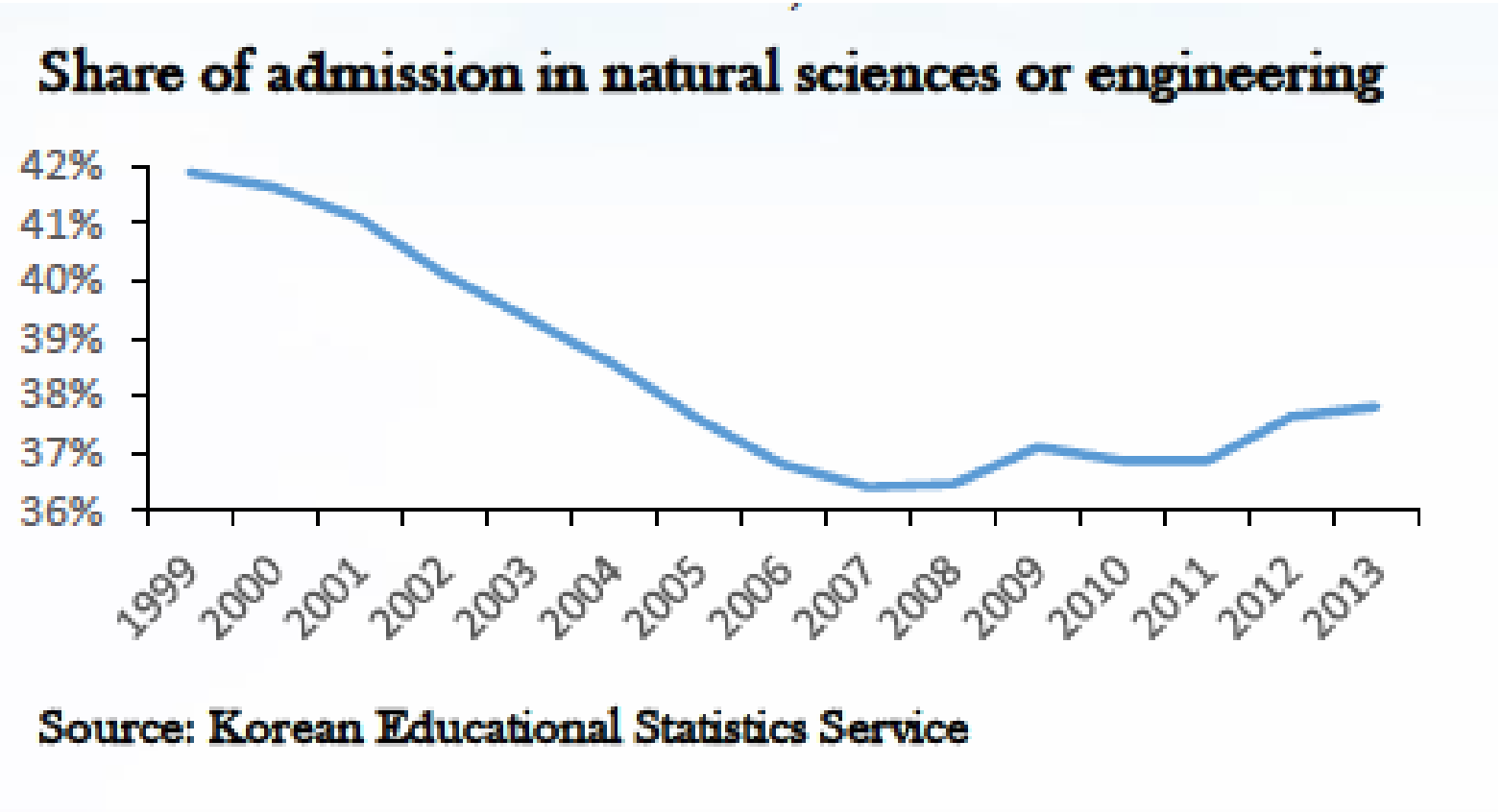
# (1) MANPOWER / LABOR FORCE NATURAL SCIENCE / ENGINEERING



# (1) MANPOWER / LABOR FORCE QUALIFIED PERSONAL

- 2/3 of young Koreans have a university degree.
- Many are overqualified und therefore underpaid.
- 12 % of young people are jobless.
- Skilled labour force diminishing, social status declining (>>tradition)
- Social security scheme only for the regular employed manpower

# (1) MANPOWER / LABOR FORCE MEASURES:

- increase productivity
- encourage automatic manufacturing
- attract foreign engineers
- foster vocational training on all levels with **industrial participation**
- encourage students to choose science and engineering by providing **industrial grants**

# (1) MANPOWER / LABOR FORCE MEASURES:

- Increase efficiency of R&D investment
- Improve R&D management systems
- Universities harbor 72.7% Ph.D´s but account for about 10% of GERD!
- Create fundamental/generic technology
- Strengthen the very weak **SME** sector

# THREADS TO GROWTH

## (2) STRUCTURE

Structure of the economy is in favour of Chaebol

Samsung stands for 20 % of GDP.

Hyundai Motor stand for 13% of GDP.

The 5 big Chaebol account for 90% of all revenues,

Hyundai + Samsung 76 %.

# THREADS TO GROWTH

## (2) STRUCTURE

**TOO BIG TO FAIL?** SEE

- NOKIA
- KODAK
- COMPAQ
- XEROX
- VOLKSWAGEN

# THREADS TO GROWTH

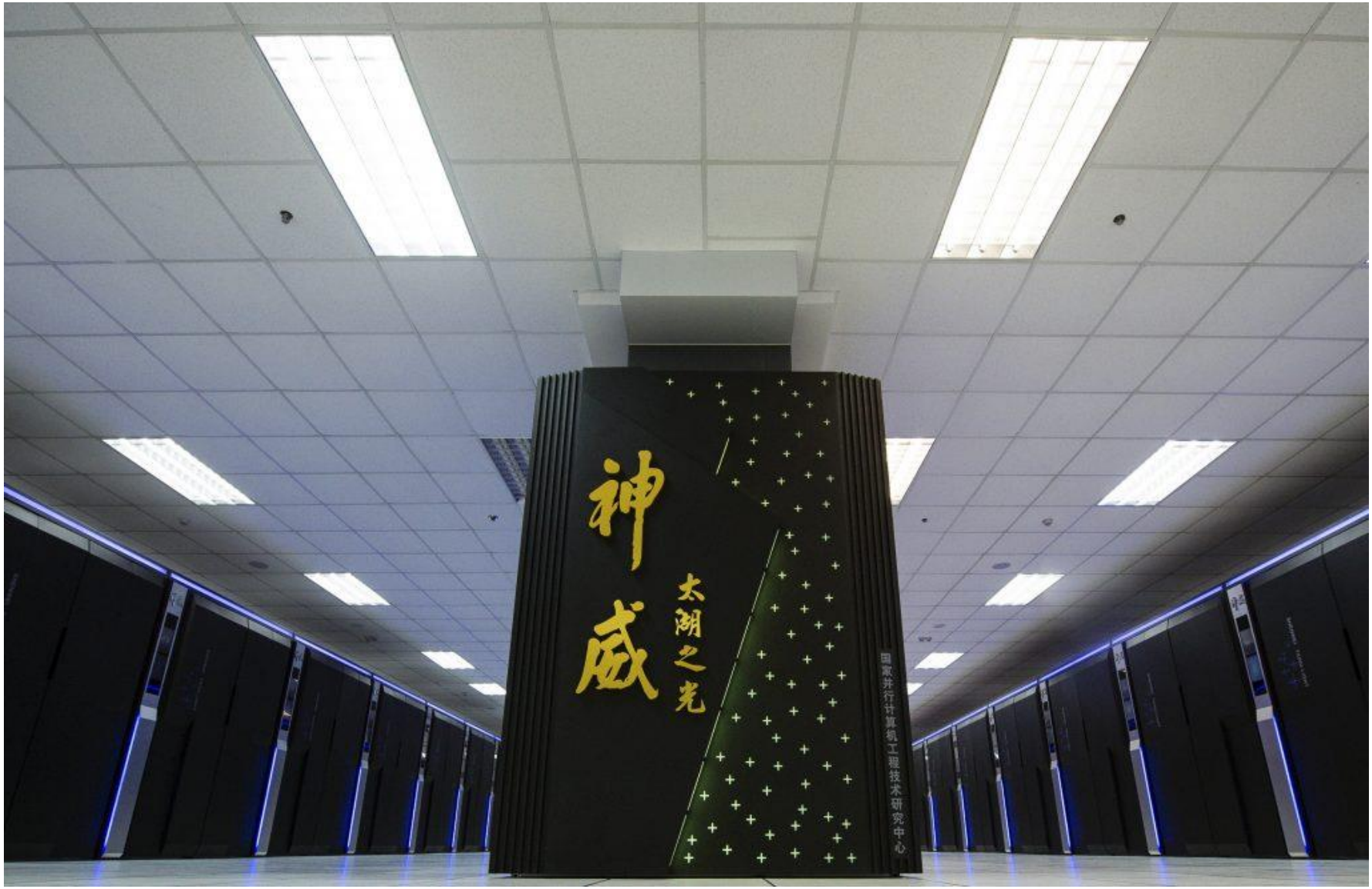
## (3) COMPETITION

Recent news from International Supercomputer Conference in Frankfurt 2016:

Super speed computer in WUXI has

93 pentaFLOPS

at 6 gigaflops/Watt

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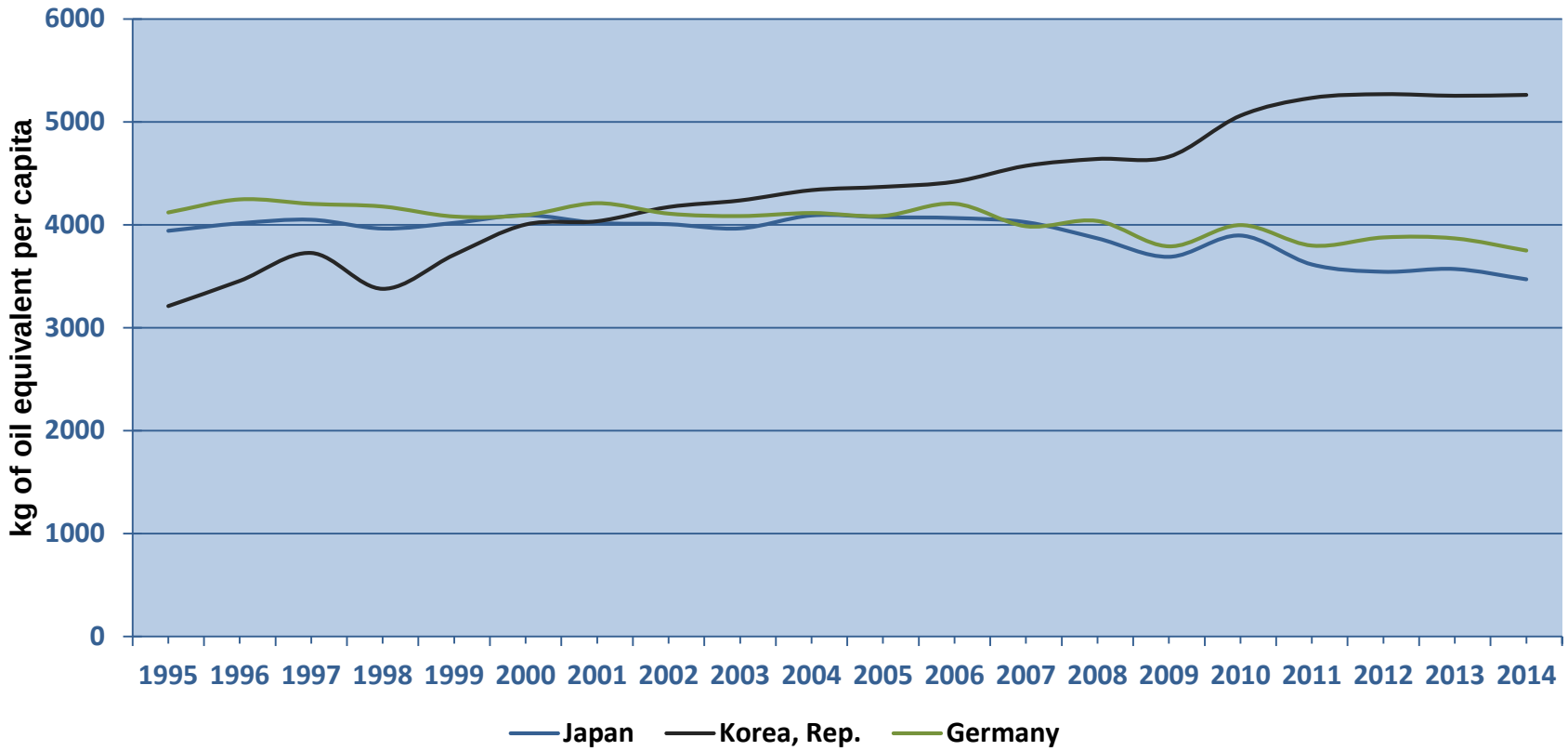
Sunway TaihuLight, Wuxi

# THREADS TO GROWTH

## (4) ENERGY

### Energy use (kg of oil equivalent per capita)




Korea: 9921 kWh/capita, European Union: 5941 kWh/capita

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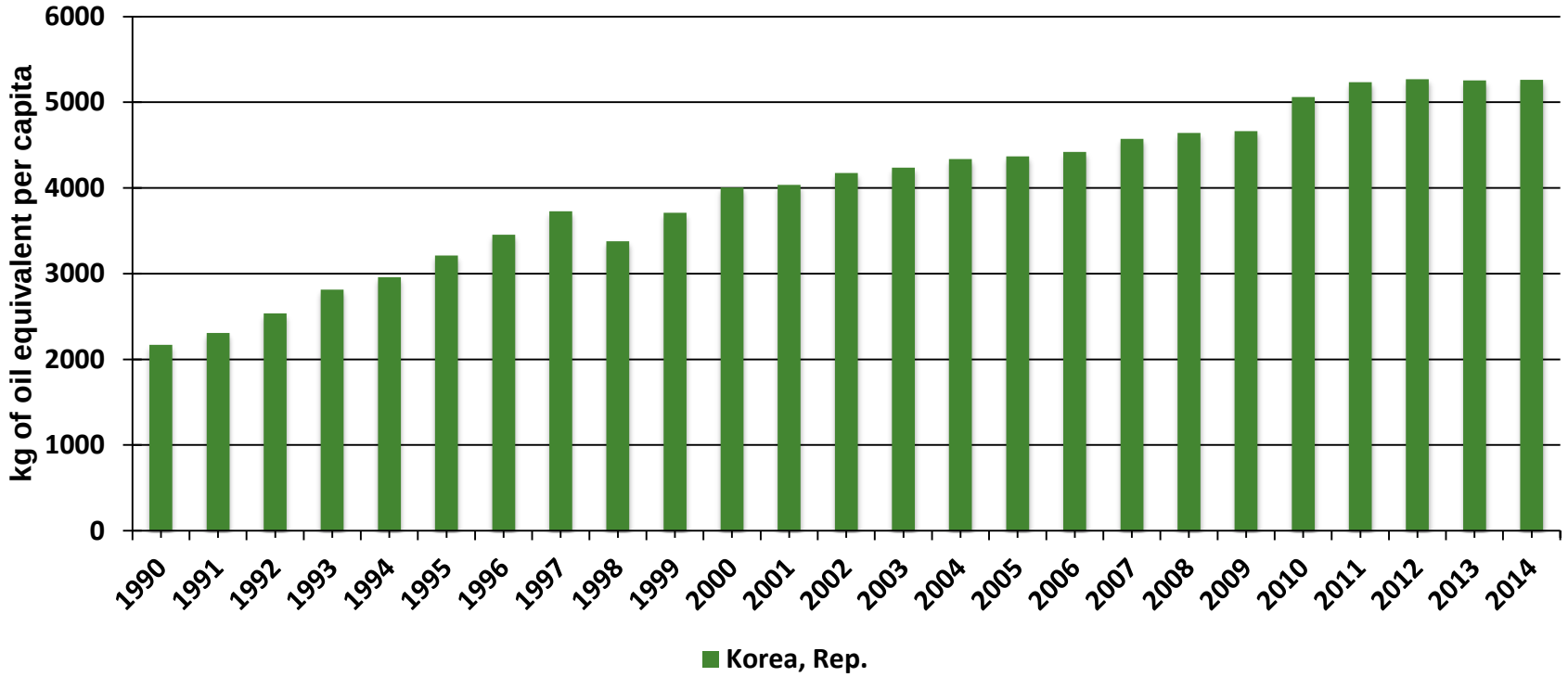
# THREADS TO GROWTH

## (3) ENERGY

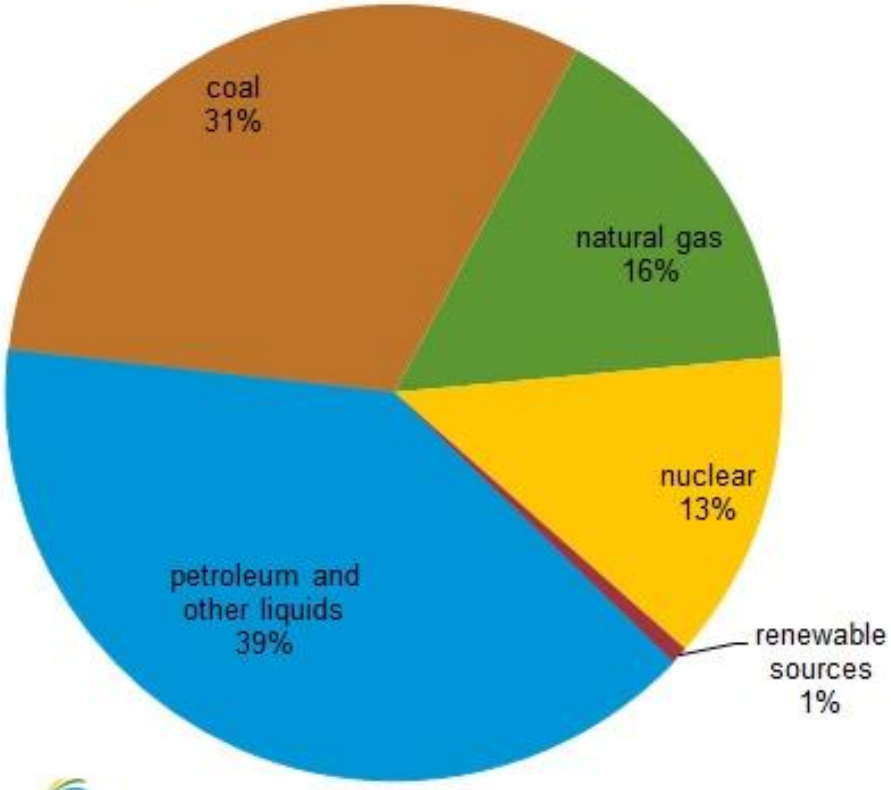
### Energy use (kg of oil equivalent per capita)



# THREADS TO GROWTH

## (3) ENERGY

Figure 1. South Korea total primary energy consumption by fuel type, 2014




eia Source: BP Statistical Review of World Energy 2015

# THREADS TO GROWTH
## (4) ENERGY

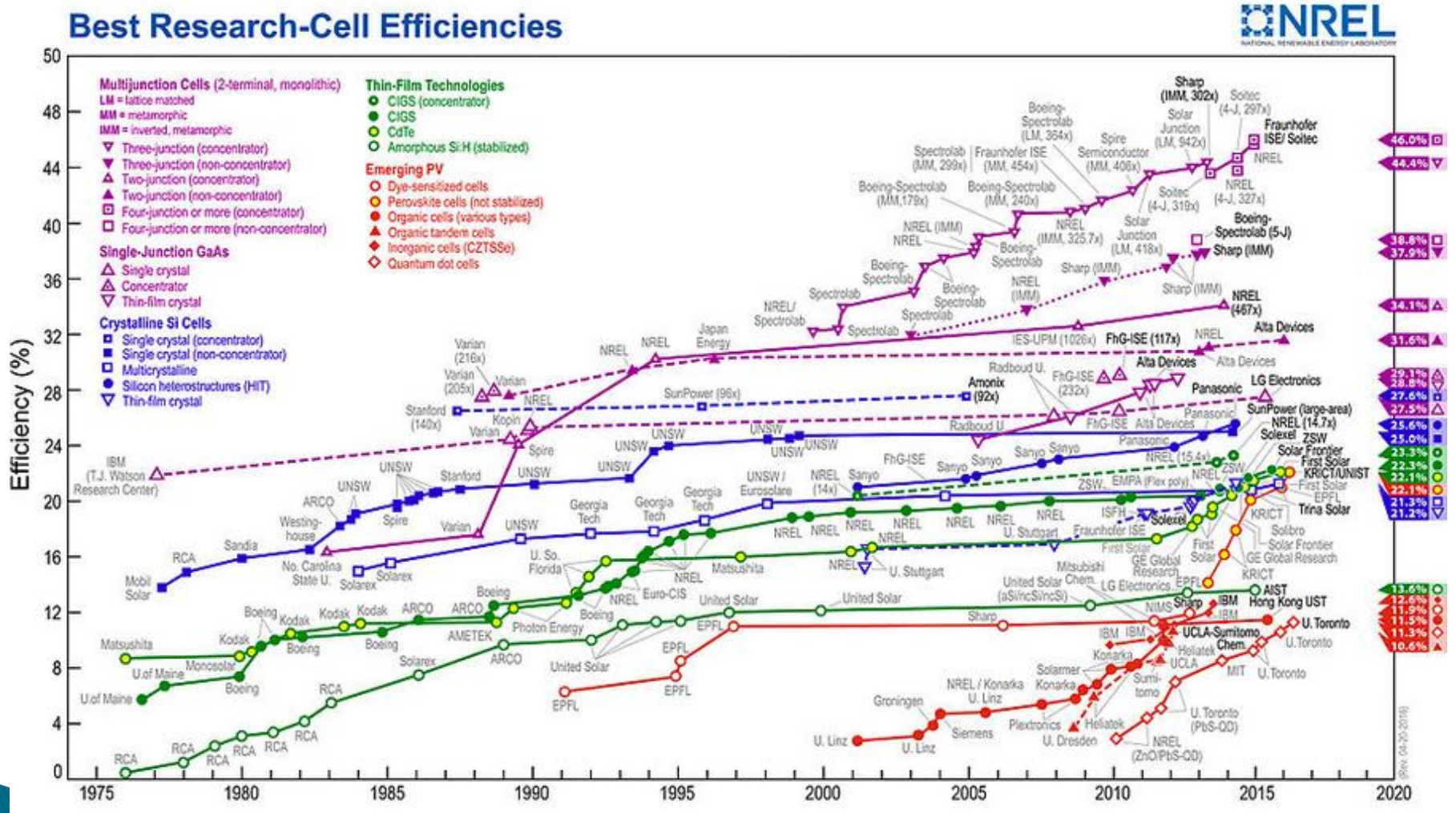

Lee K. H. KEMKO

# NEW STARTEGIC FIELDS

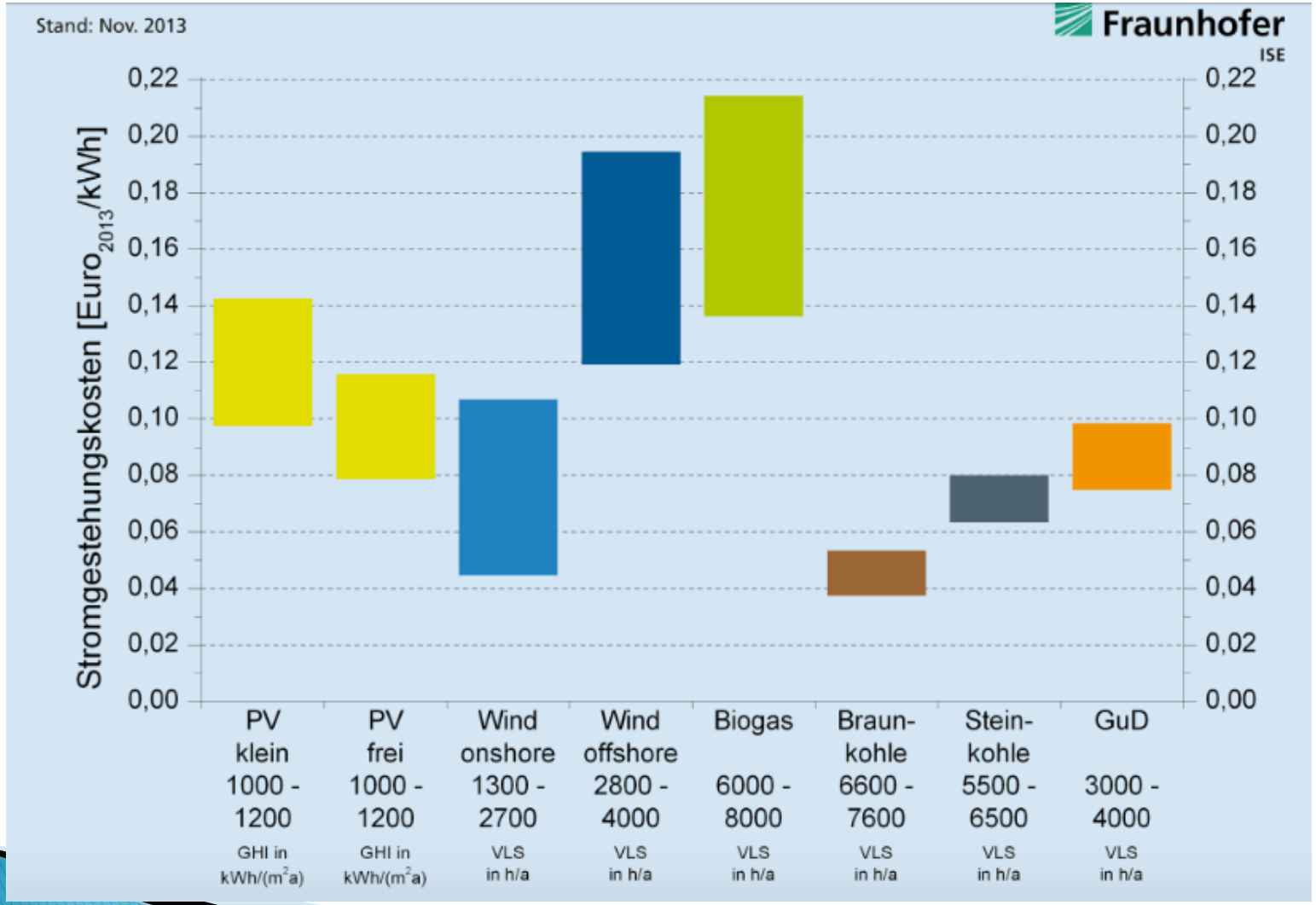
(1) Solar Energy Efficiencies:

| | |
|---|---|
| Multi junction concentrator | 45% |
| Crystaline Si cells | 22% |
| Thin film | 13-22% |
| Perovskite (KRICT!) | 10 - 12% |

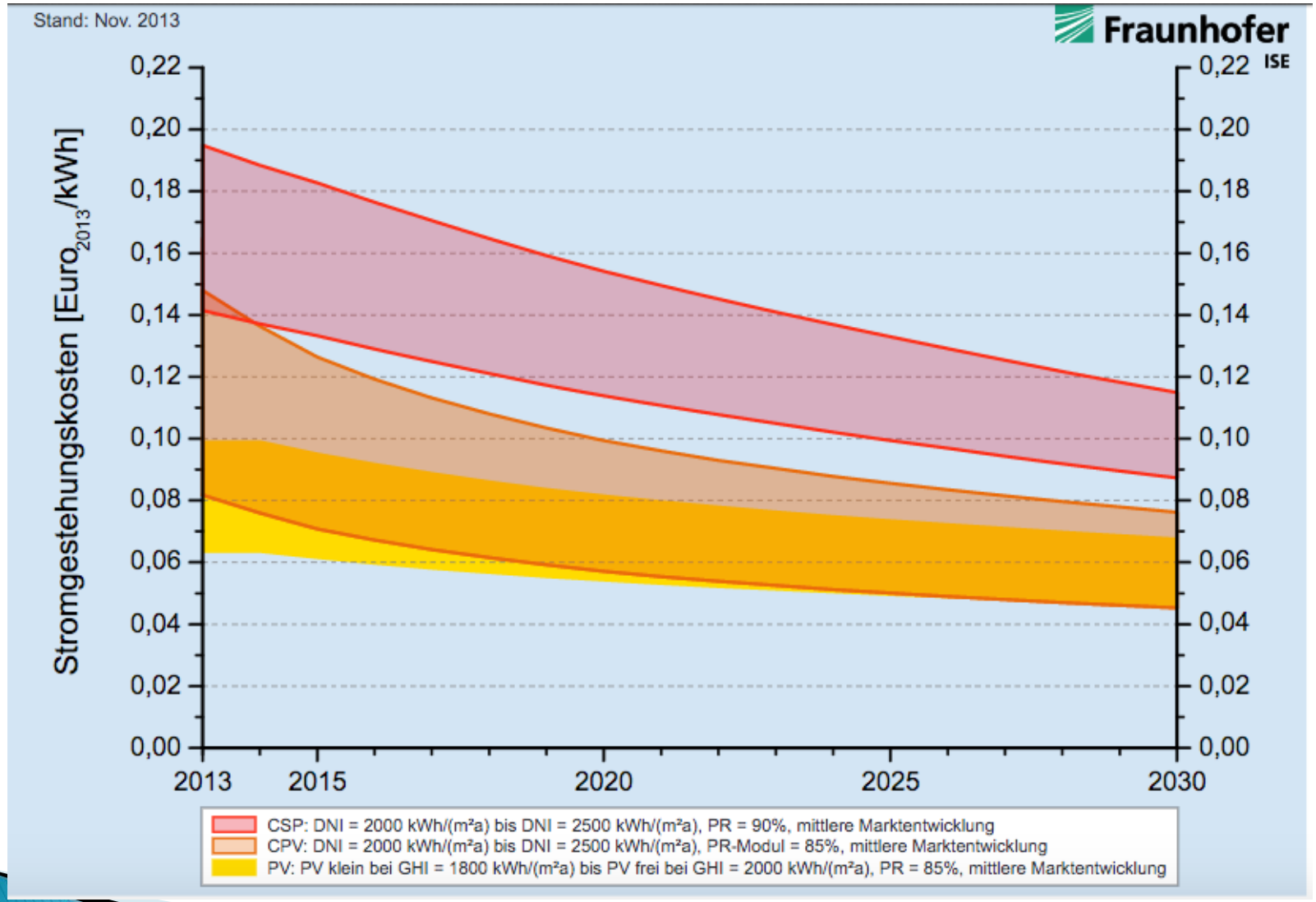
# NEW STARTEGIC FIELDS



# NEW STARTEGIC FIELDS



# NEW STARTEGIC FIELDS



# NEW STARTEGIC FIELDS

## (2) ENERGY STORAGE

- storage, batteries
- power to gas converters
- thermal storage

# NEW STARTEGIC FIELDS

(2) GREEN ENERGY
power to gas converters:

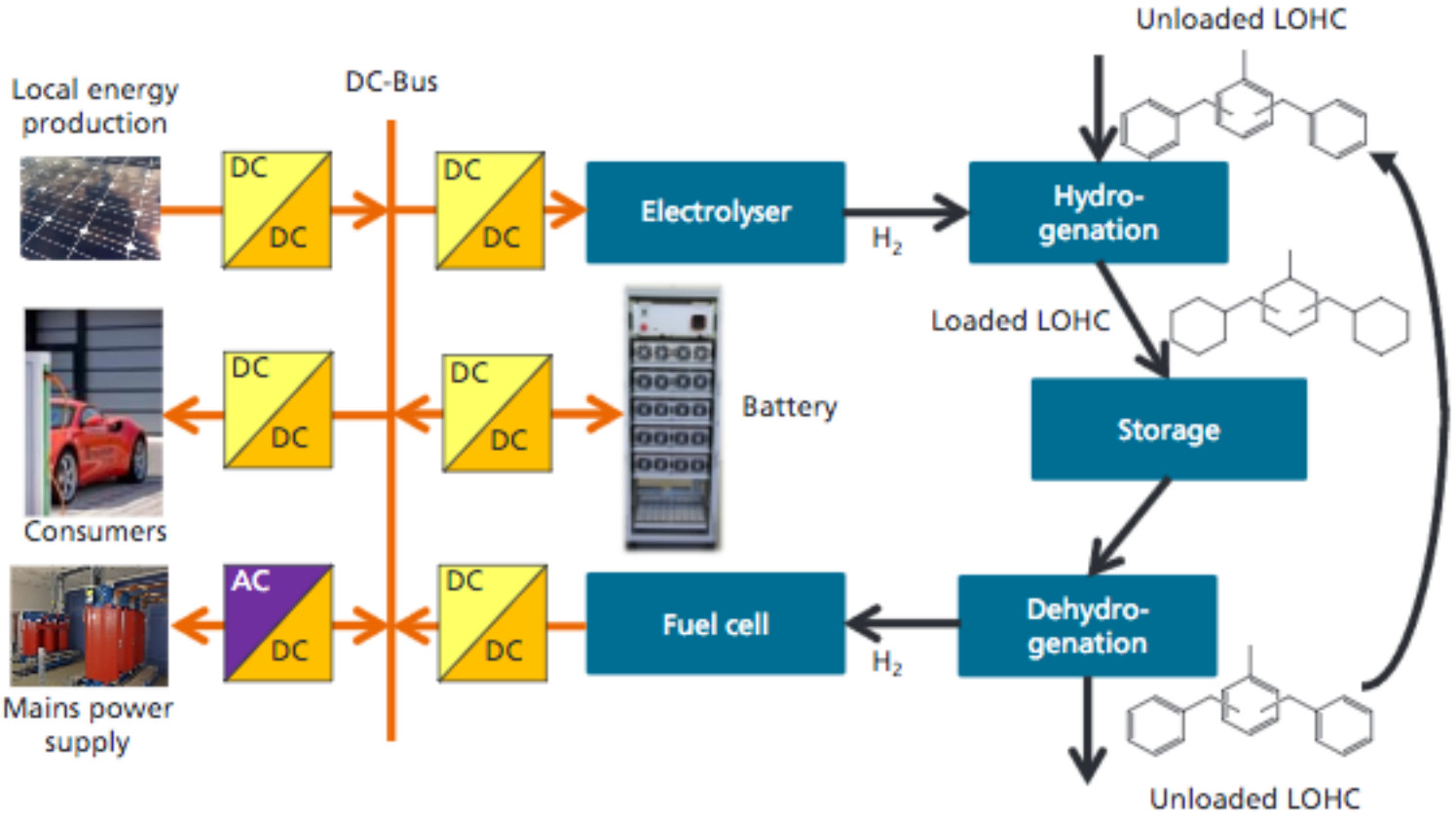
- Hydrogen Technology
- Methan Technology

# THREADS TO GROWTH
## (3) ENERGY

Seung Il Cheong, DG at MOTIE in 2013

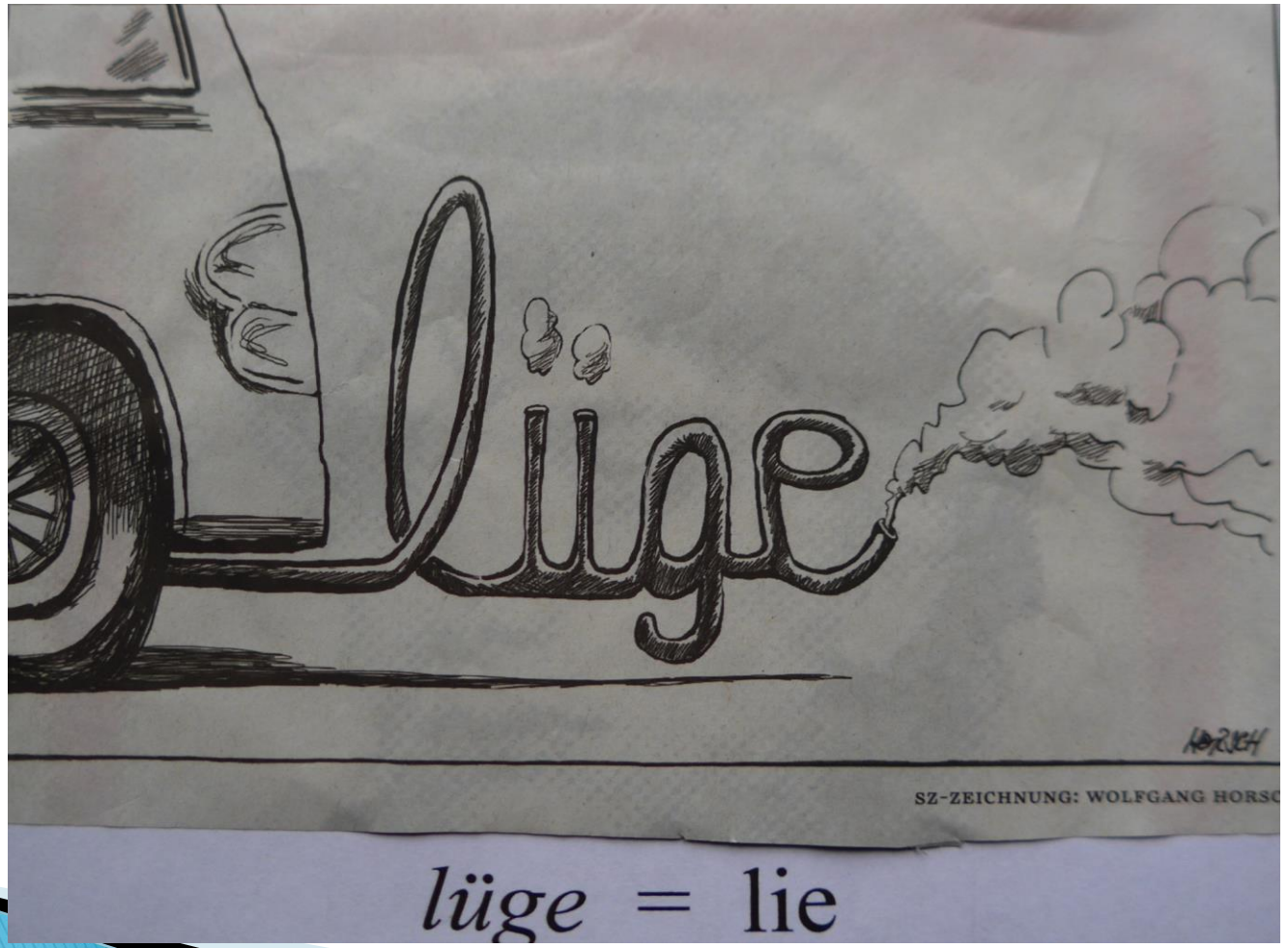
“ To minimize social and economic costs, the government will be developing and investing in such technologies as integrated gasification combined cycle with carbon capture and storage.“

# NEW STARTEGIC FIELDS



# NEW STARTEGIC FIELDS

## (3) CAR INDUSTRIES



# NEW STARTEGIC FIELDS

## (3) CAR INDUSTRIES

faces a revolution:

no sheet metal, no piston, no carburetor, but:

- electric drive,
- CF reinforced plastic,
- automatic steering,
- and...and...and....

# NEW STARTEGIC FIELDS

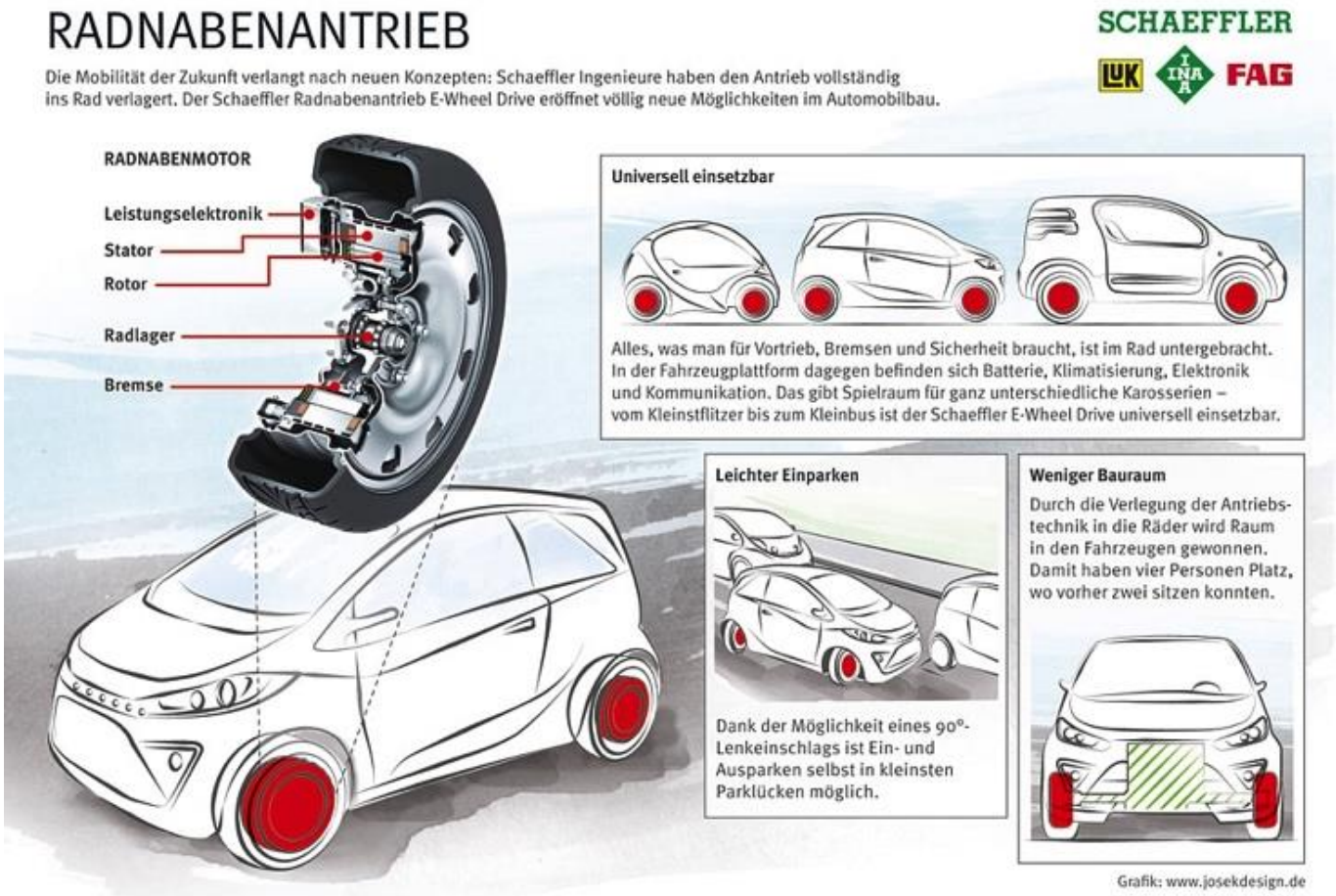

-HEV
-PHEV
-EV

# NEW STARTEGIC FIELDS

HUB - MOTOR

SCHAEFFLER

# NEW STARTEGIC FIELDS



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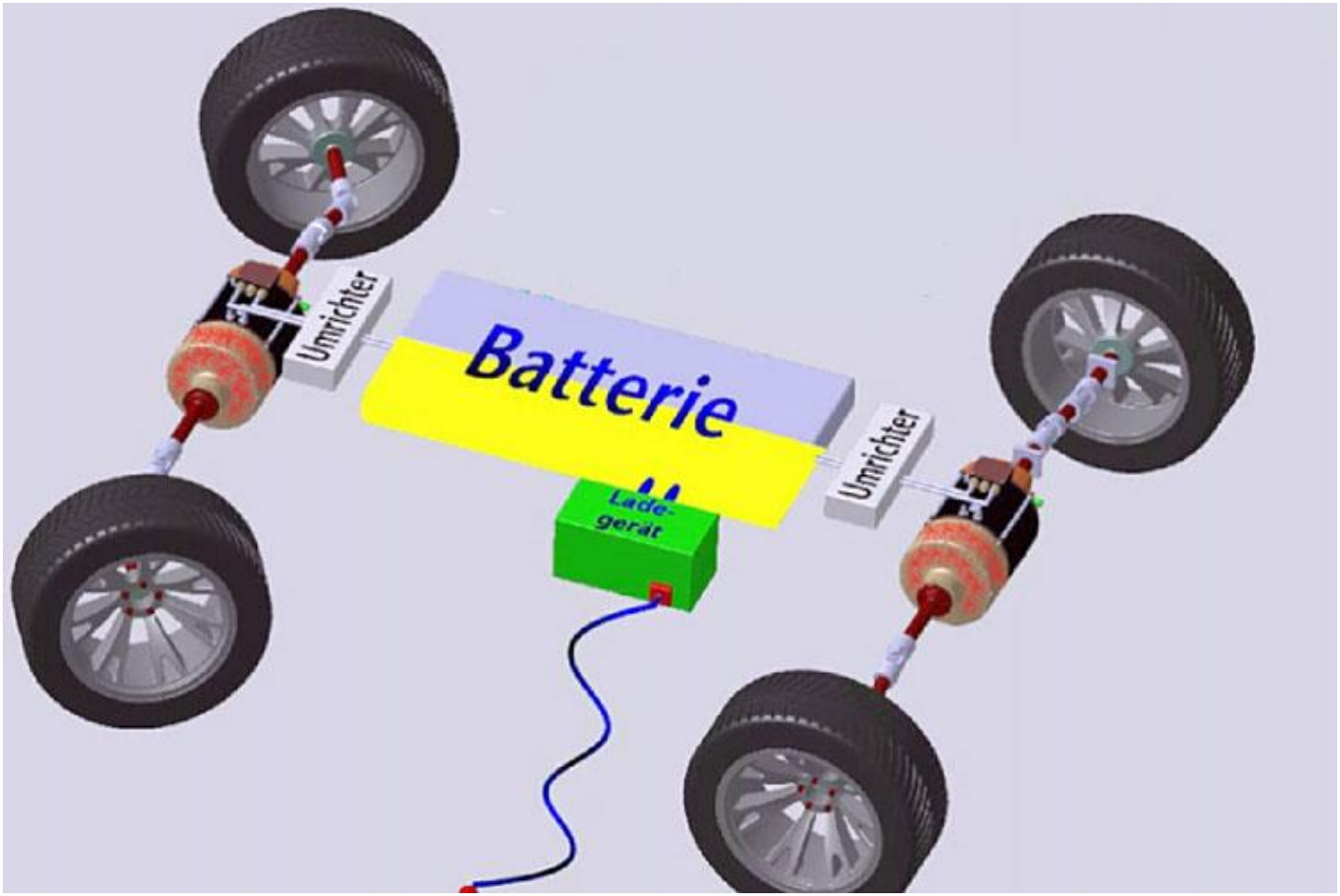

# NEW STARTEGIC FIELDS

# NEW STARTEGIC FIELDS

(3) THREE-D PRINING for the production process

Rapidly growing market by more than 30%

# NEW STARTEGIC FIELDS

- stereolithography
- digital light processing
- laser sintering / laser melting
- extrusion / FDM / FFF
- Selective deposition lamination (SDL)
- Electron beam melting (EBM)

# NEW STARTEGIC FIELDS

SEEK FOR
SYSTEM SOLUTIONS
NOT FOR
SINGLE SOLUTIONS!

# NEW STARTEGIC FIELDS

THE VISION IS:
NOT TO BE BIG, BUT TO BE BETTER!

THINK DIFFERENT!

# THANK YOU



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