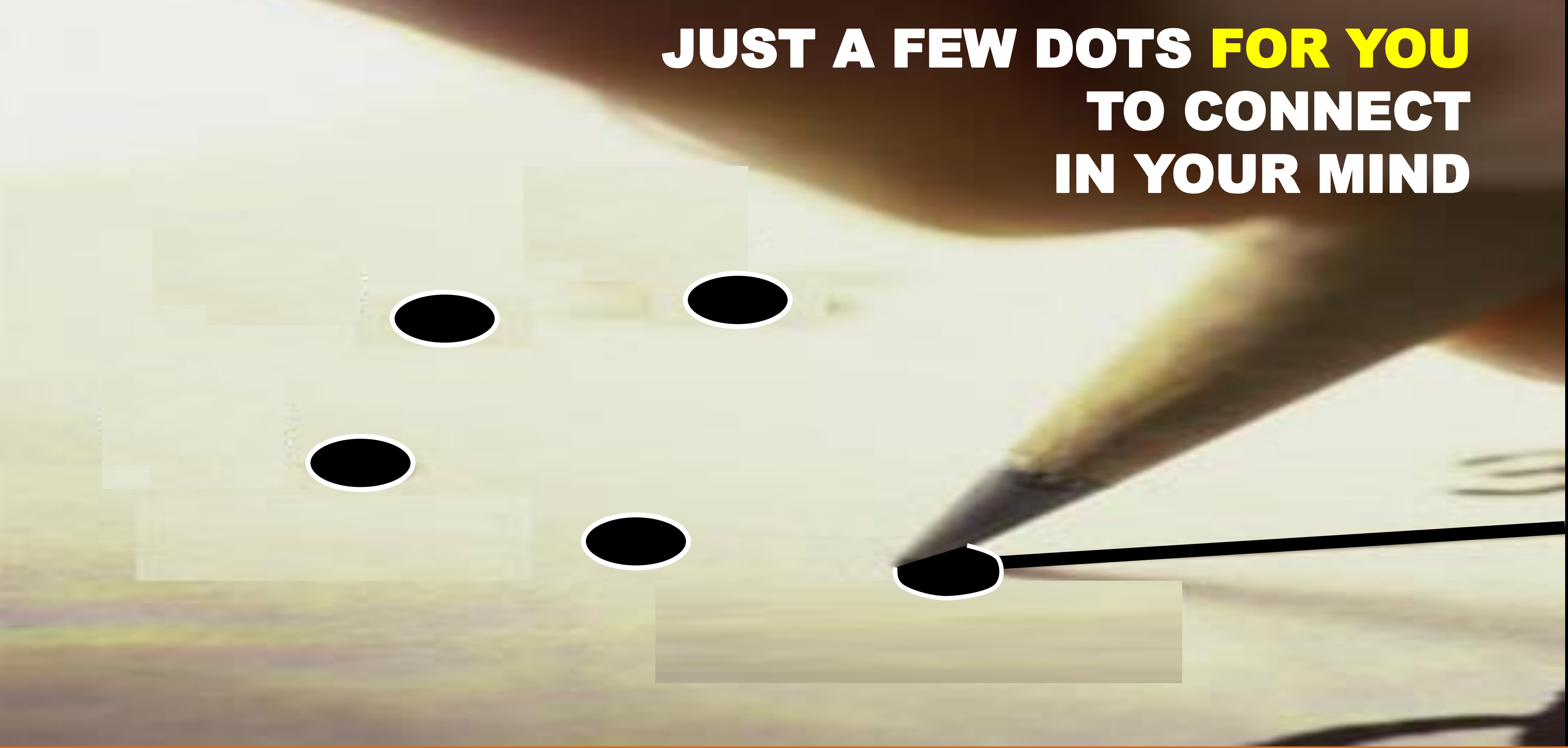
WARNING

NOT PAINT BY NUMBERS

JUST A FEW DOTS FOR YOU TO CONNECT IN YOUR MIND



TEXAS

The Internal Combustion Engine (ICE) Is Behind

~25% OF GLOBAL ANNUAL CO_2 EMISSIONS

HOOK'EM HORNS

CEO JARAND RYSTAD

Within 45 years (= 3 ‘car generations’) – in 2060 - we will all be driving electric cars. And, this is consistent with the <+2degC goal

Source: DN June 4, 2015, Photo: Thomas Haugersveen


ELON MUSK
In 20 years, in 2035, to own a normal car (a car that requires a driver) will be like owning a horse; you only have it for sentimental reasons

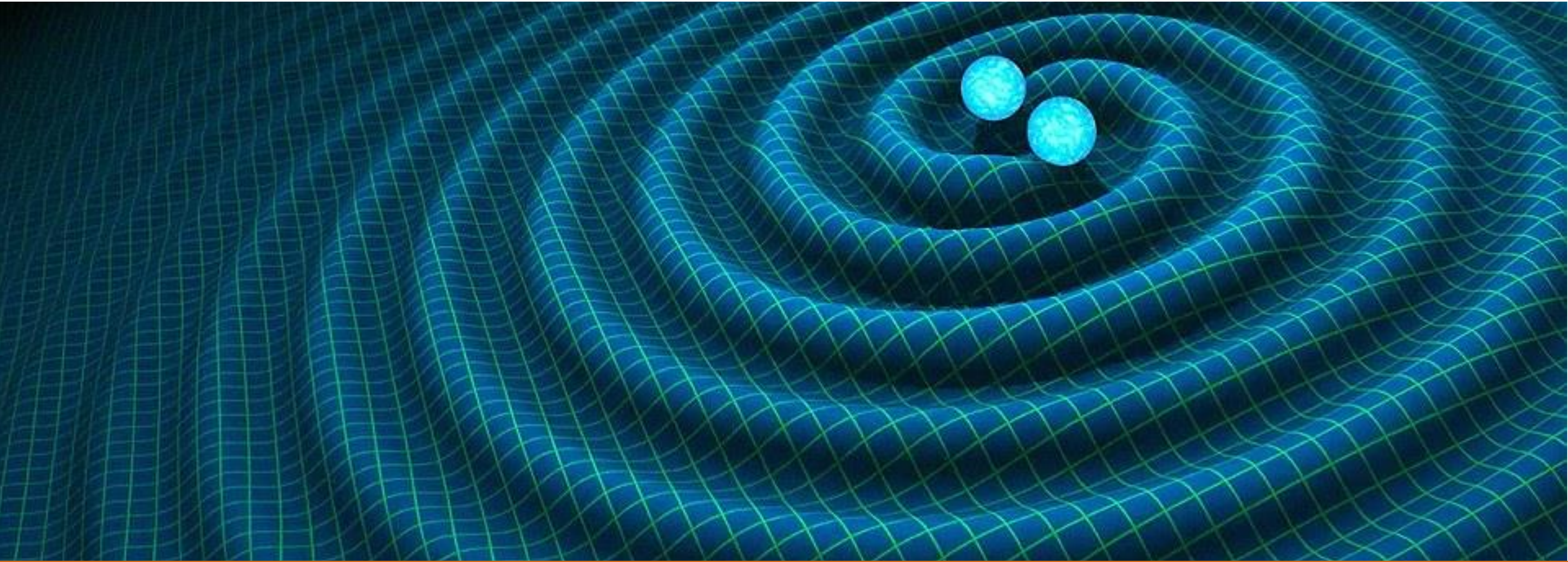
OUTLINE

- INTRODUCTION
- THIS WEEK IN HISTORY
- OIL PRICE: NOONE IS FIT@30-50
- E&P2.0
- LIKE!
- GLOBAL ENERGY OUTLOOK
- CREATIVE DESTRUCTION
- REFLEXIONES FINALES

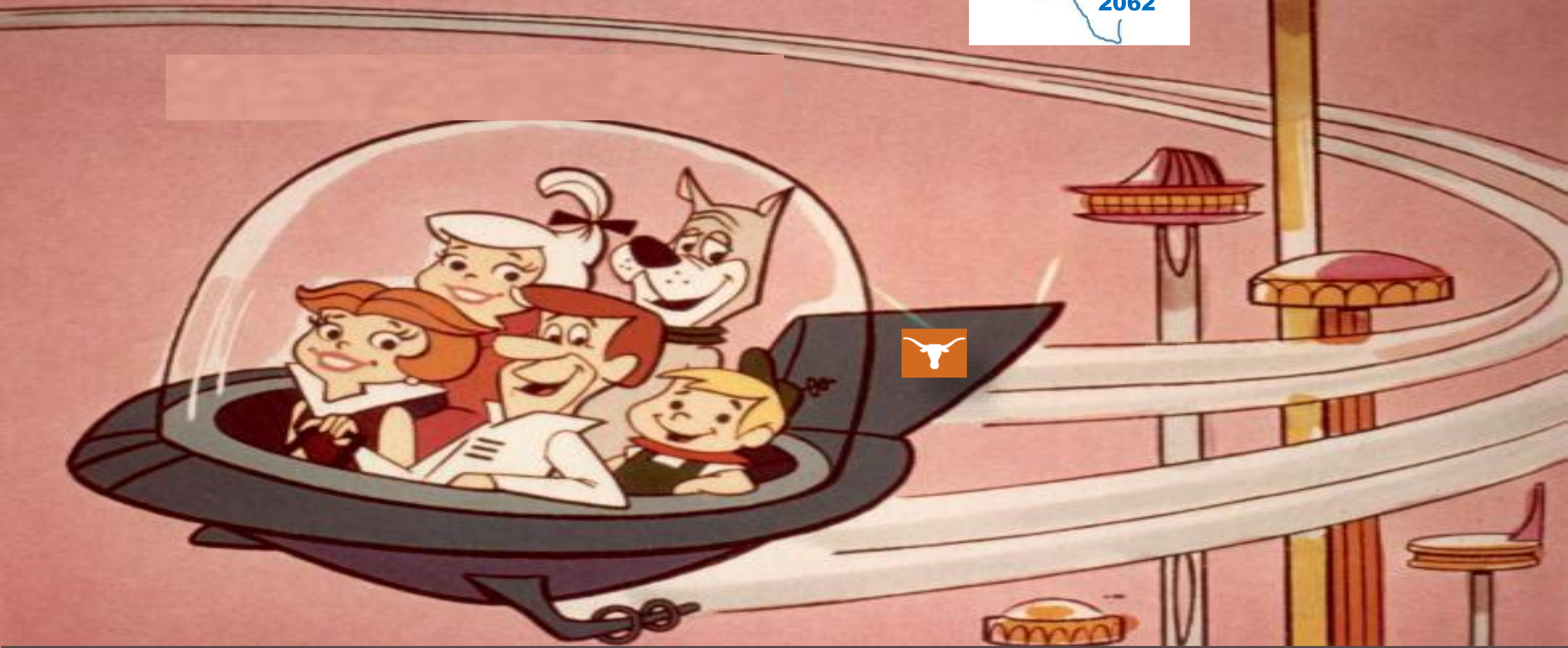
February 16, 2016 22:56 UTC

Science in the News

Gravitational Waves Detected, Einstein Is Right

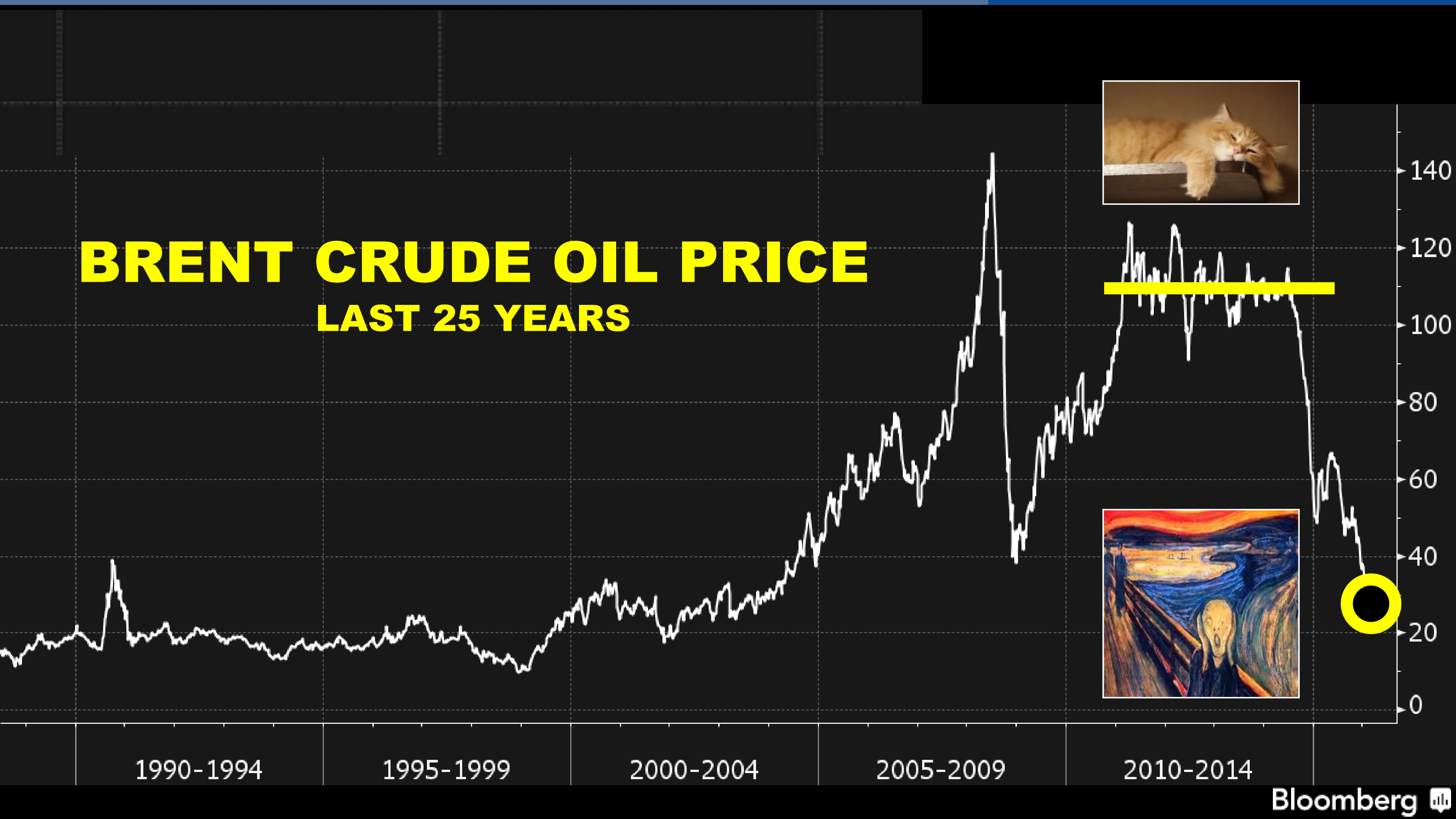


The Jetsons On The Way To UT ENERGY WEEK 2062




STAR WARS
MILLENNIUM
FALCON
UT
ENERGY
WEEK
2100
SPE
International

Note: Thiel co-founded PayPal with Elon Musk and served as its CEO


BRENT CRUDE OIL PRICE
LAST 25 YEARS
140
120
100
80
60
40
20
0
1990-1994
1995-1999
2000-2004
2005-2009
2010-2014
Bloomberg


BARRON'S

The Dow Jones Business and Financial Weekly Vol. XCVI No. 6 barrons.com February 8, 2016 $5.00

BEST MUTUAL FUND FAMILIES Section Inside

UP & DOWN WALL ST. • 7
Petrodollar recycling in reverse

STREETWISE • 11
U.S. industrials get boost from China

BEZOS' BAG OF TRICKS • 16
Amazon: almost down to fair value

TAKEOVER BAIT? • 16
GoPro off 70% since we panned it

BEWARE MLPs • 22
The man who slayed Kinder Morgan

GILEAD, CELGENE • 25
2 beat-up biotechs with 30% upside

AVOIDING RECESSION • 30
Despite turmoil, Yardeni is optimistic

HERE COMES $20 OIL

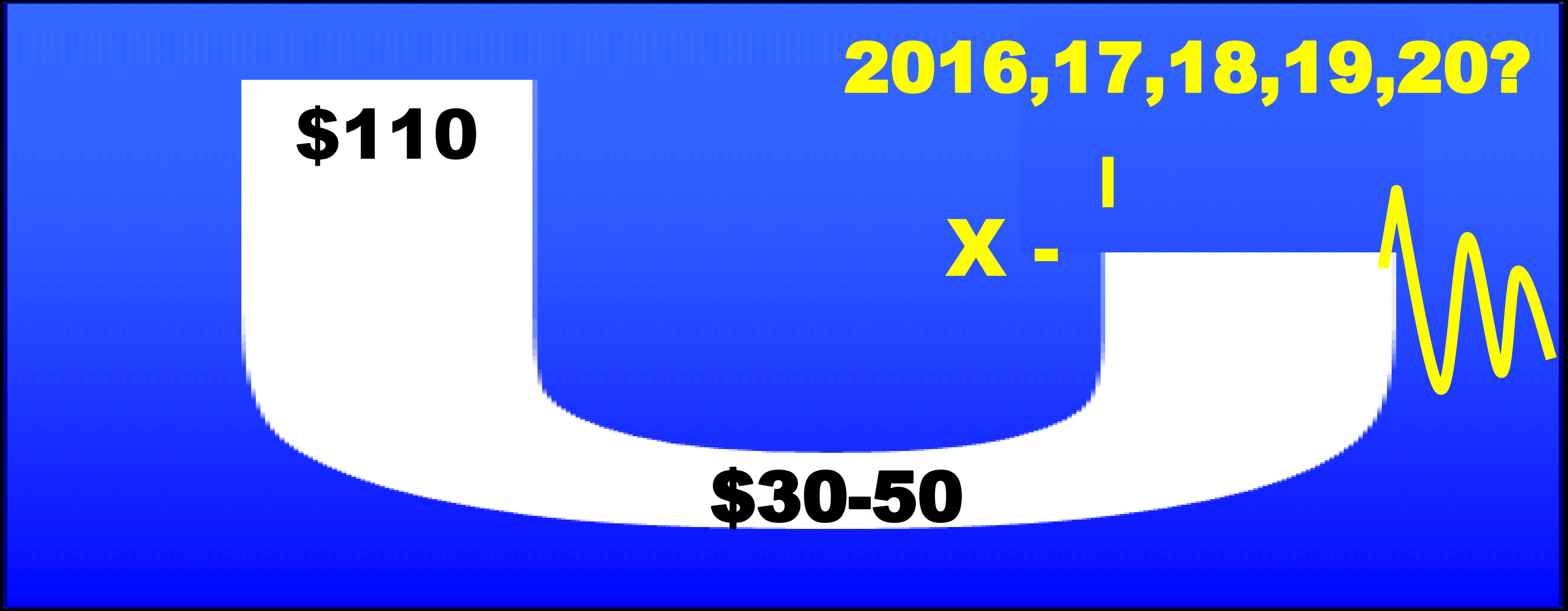
Oil prices will bottom at $20 soon. So says an indicator that has been correct for the past two years. Why oil should move back up to around $55 late this year.

REALLY

?

Most Analysts Predict That Oil Prices Will Be

LOWER FOR LONGER



$100/BBL CAVALRY

IS NOT COMING TO THE RESCUE

JANUARY 21, 2016: MOODY'S PLACES 120 OIL & GAS COMPANIES ON REVIEW FOR DOWNGRADE“

- Oil prices will continue to fall in 2016
- In 2-3 years, the prices will rebound to ‘the new normal’ of $65-70 per barrel

Senior Analyst at Oppenheimer & Co.

Fadel Gheit

Source: http://www.cnbc.com/2016/01/11/half-of-us-shale-drillers-may-go-bankrupt-oppenheimers-gheit.html, http://www.mt5.com/experts_say/fullview/1858/

Vitol Group
BV CEO
Mr. Ian Taylor

“ We really do imagine a band,” probably between $40 and $60 a barrel, he said. “ I can see that band lasting for five to ten years. I think it’s fundamentally different "

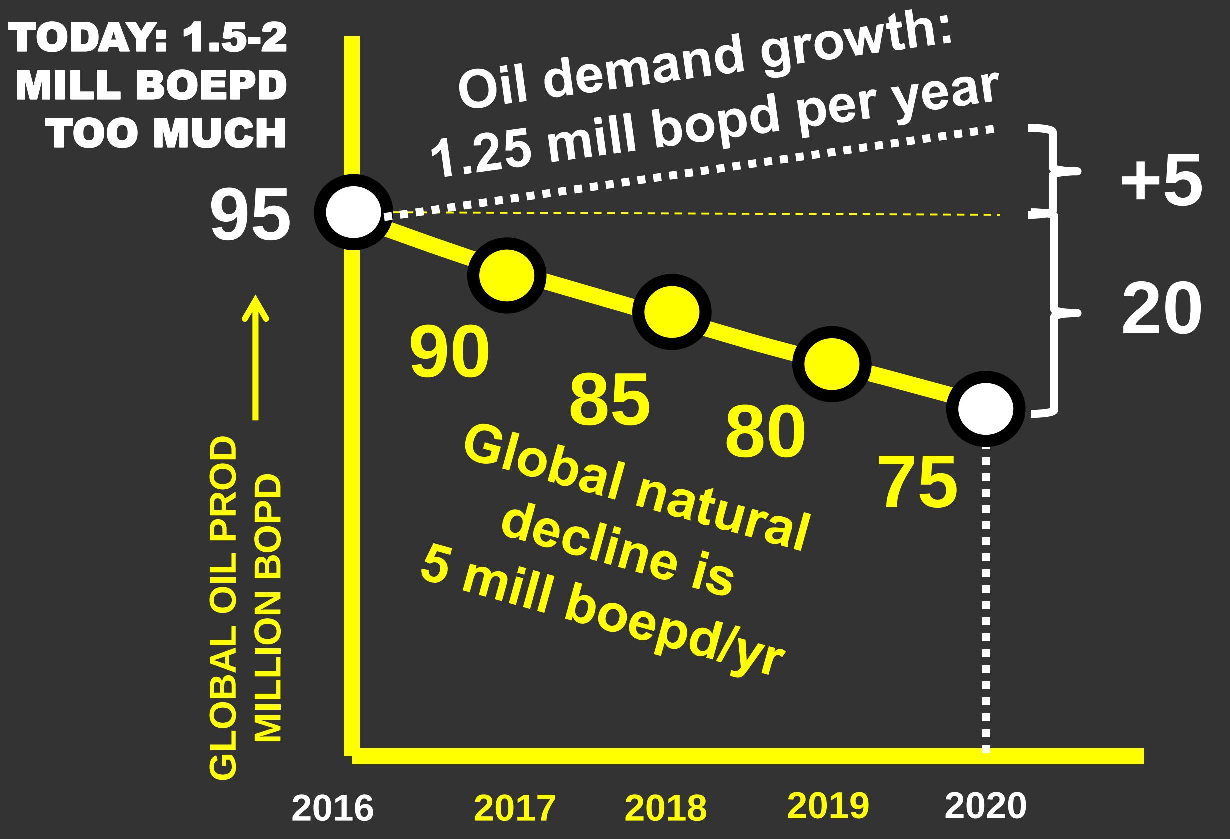
Source: http://www.bloomberg.com/news/articles/2016-02-08/world-s-largest-energy-trader-sees-a-decade-of-low-oil-prices

NOV. 2015 - CEO RYSTAD ENERGY

JARAND RYSTAD

- Crude prices of 50-70$/B not sustainable beyond 2017 (as global demand again overtakes supply)
- 2016: $62/BBL
- 2017: $79/BBL
- 2020: $113/BBL


REALITY
CHECK
AHEAD



A VERY TALL ORDER

To add 25 mill boepd of new oil production (= 2 X KOSA's current oil production) in just 4 years !

- LOST E&P JOBS: 250,000
- STUDENTS: CAN'T FIND JOBS
- STUDENTS FEEL LET DOWN

ft.com > companies > energy >

Oil & Gas

Home | World | Companies | Markets | Global Economy | Lex | Comme

Energy | Financials | Health | Industrials | Luxury 360 | Media | Retail & Consumer | Tech | Telecoms

September 21, 2015 12:01 am

Plunging oil prices put question mark over $1.5tn of projects

Christopher Adams, Energy Editor

Share | Author alerts | Print | Clip

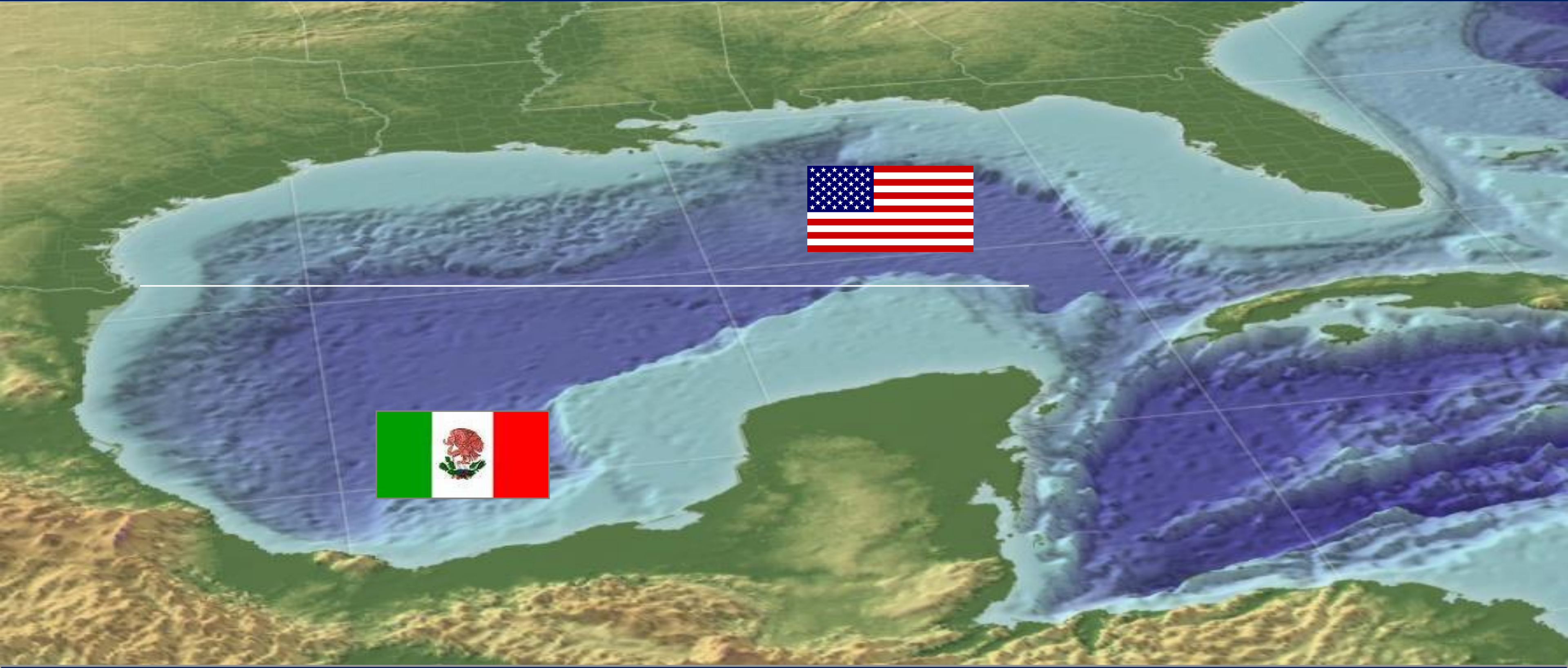
SPE International

- TOTAL expects >1.2mmbbl/d of demand growth in 2016
- Cumulative industry project delays will result in a 5-10 mill b/d supply gap by 2020

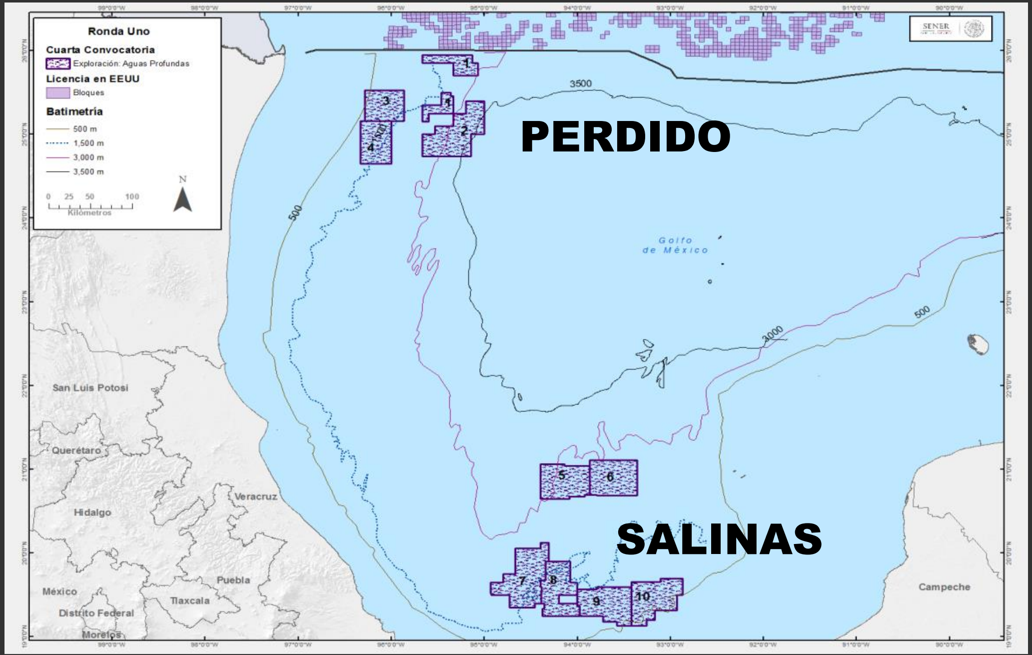
TOTAL CEO
PATRICK POUYANNE

Source: TPH Feb.11, 2016

MEXICO = E&P2.0



MEXICO BID ROUND NUMBER 4: ROUND 1.4
THE FIRST DEEP WATER ROUND IN MEXICO



- **Blocks are in the PERDIDO and the SALINAS basins**
- **10 DW (500-3000m WD) blocks (1500-3000+ sqkm) on offer**
- **Bid deadline to be announced in 3Q 2016**

ABSOLUTELY NOBODY IN THE E&P ECO-SYSTEM IS

FIT@30-50

- INDIVIDUAL OPEC COUNTRIES: NO
- US, RUSSIA, BRAZIL, NORWAY: NO
- NOCs: NO
- MAJORS: NO
- INDEPENDENTS: NO
- SERVICE COMPANIES: NO
- CONTRACTORS: NO
- SUPPLIERS & VENDORS: NO
- UNIVERSITIES: NO
- PROFESSIONAL ASSOCIATIONS LIKE SPE, AAPG, SEG,..: NO

SPE International

SAUDI OIL MINISTER: I Don't Care If Prices Crash To $20 — We're Not Budging

Note: Saudi Arabia’s Oil Minister Mr. Ali al-Naimi

" In Saudi Arabia, we recognize that eventually, one of these days, we are not going to need fossil fuels. I don't know when, in 2040, 2050 or thereafter "

Saudi Arabia Oil Minister Ali Al-Naimi

OPEC's Secretary General
Abdullah al-Badri

200 YEARS : PRICE OF ALL COMMODITIES
(10 YEAR AVERAGE RATE OF RETURN)

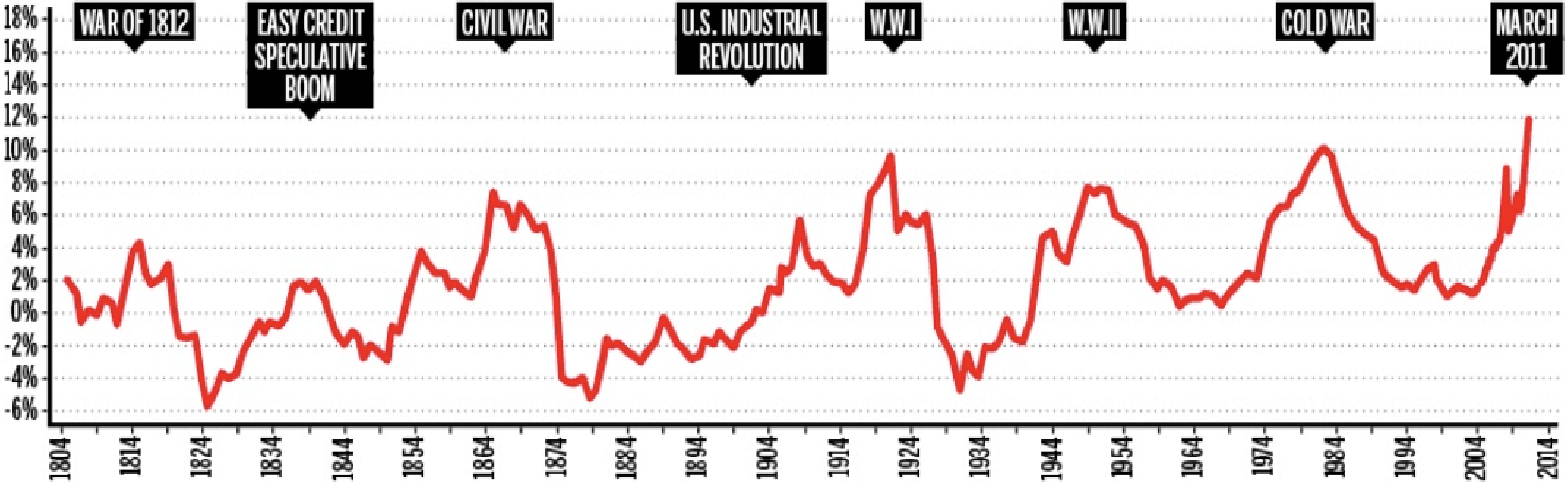


CHART SOURCE: HACKETT FINANCIAL ADVISORS, MACLEAN'S

- VERY LONG HW & HF: + 5 MILL B/D
- VERY HIGH OIL PRICE: >100 $/D
- VERY CHEAP MONEY: QE1, QE2, QE3
- ➡ TOO MUCH GL. SUPPLY: +1.5 MILL B/D

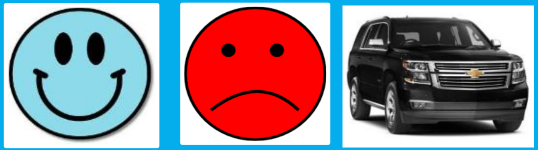
▶ >100

SOLUTION? = DISCIPLINE IN GOOD & BAD TIMES

BOOM

E&P1.0

E&P+



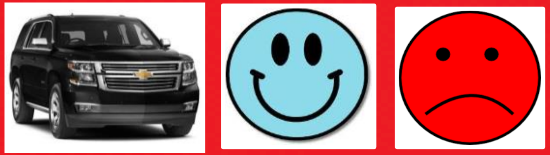
OIL PRICE UP

E&P2.0

▶ 30

BUST

E&P+

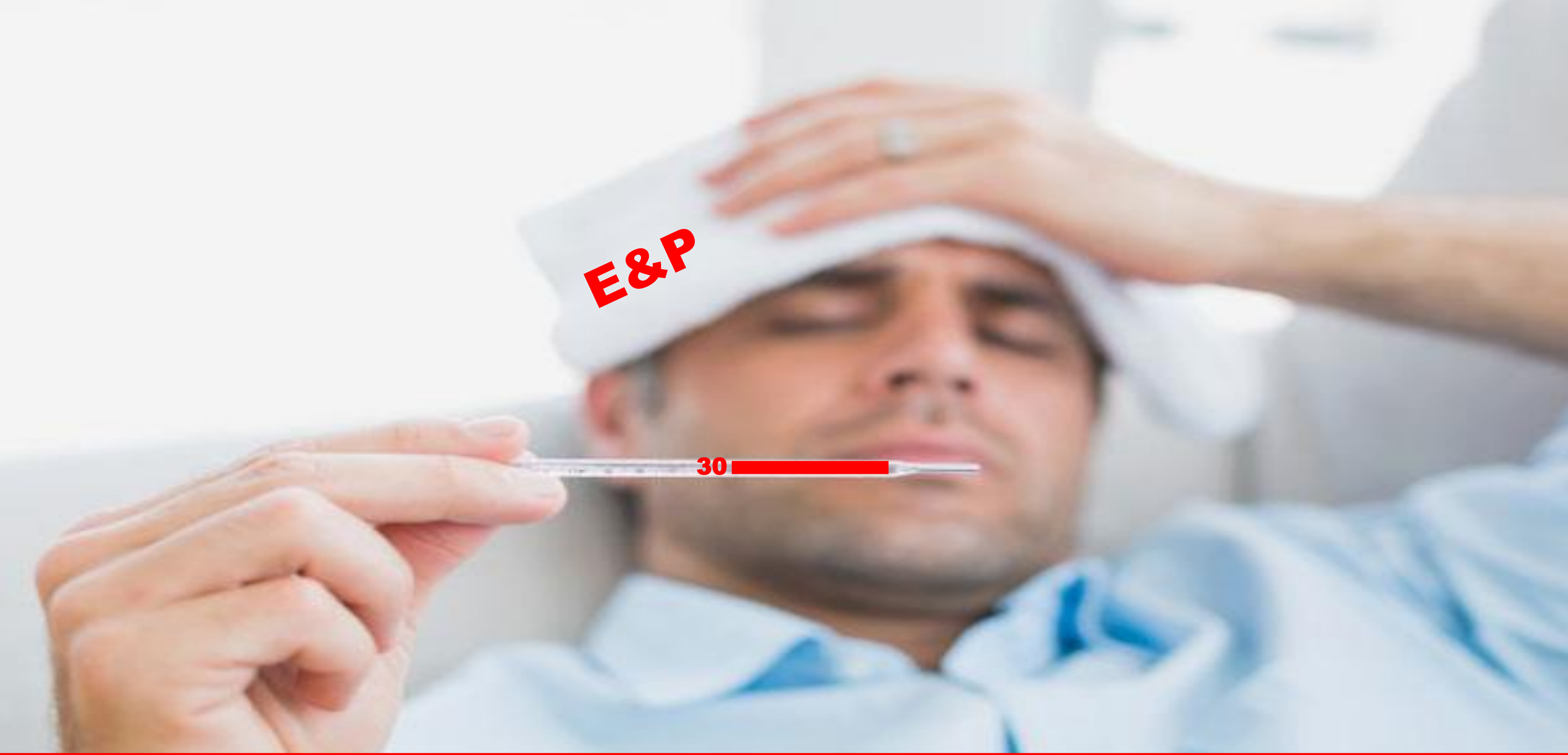


OIL PRICE DOWN

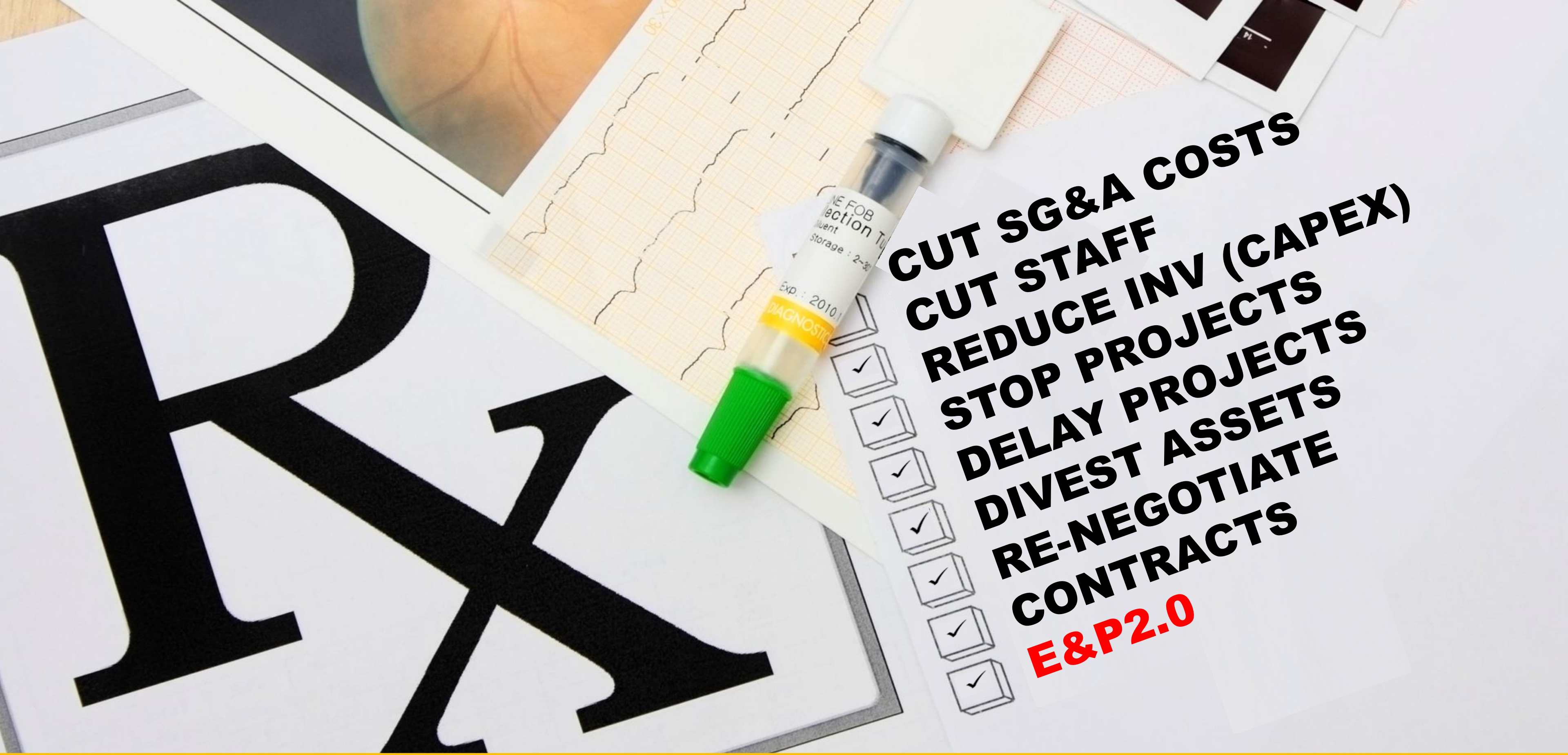
SPE International

LET'S TAKE THE PULSE OF E&P RIGHT NOW

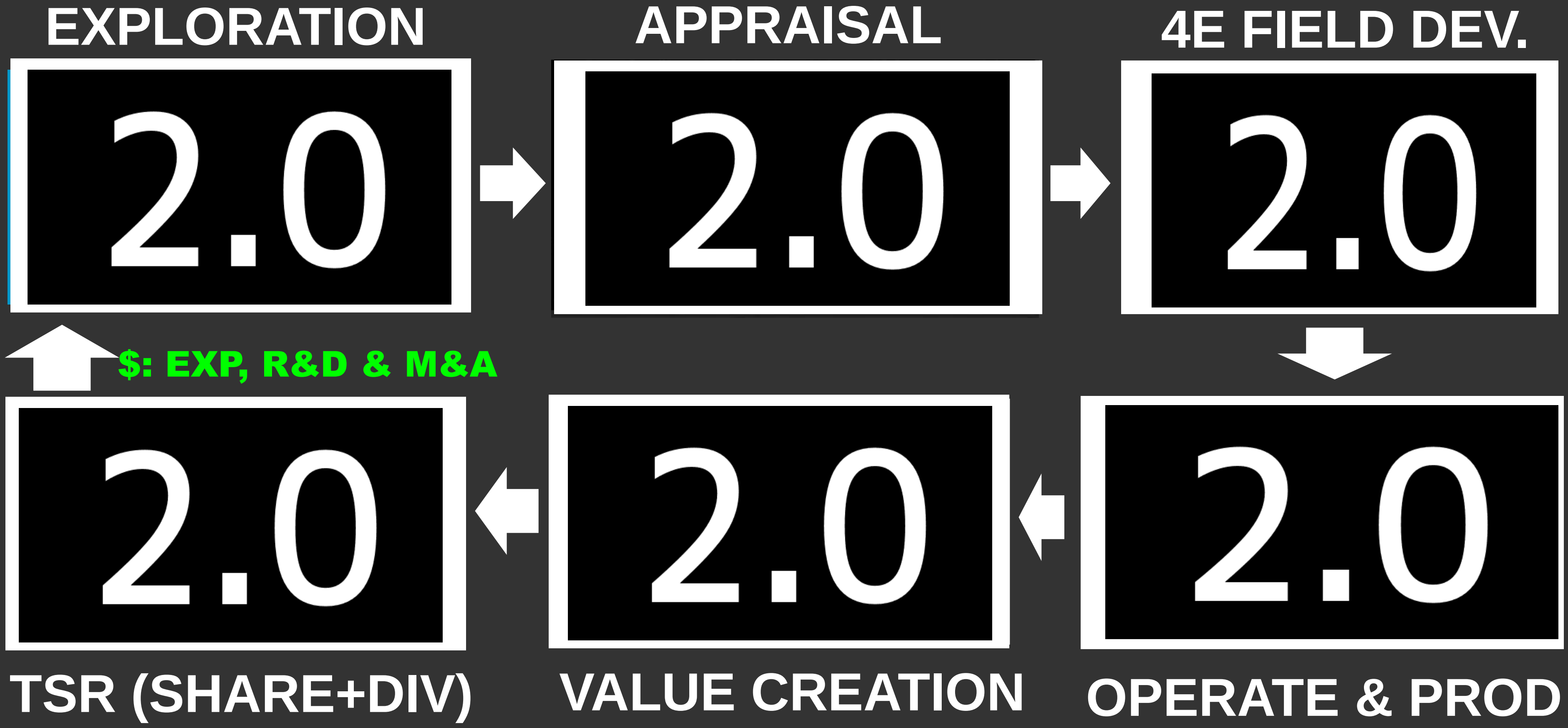
SPE International


E&P
30

SPE International


CUT SG&A COSTS
CUT STAFF
REDUCE INV (CAPEX)
STOP PROJECTS
DELAY PROJECTS
DIVEST ASSETS
RE-NEGOTIATE CONTRACTS
E&P2.0

TO MAKE E&P ‘FIT AT 50 $/BBL’


EXPLORATION
2.0
APPRAISAL
2.0
4E FIELD DEV.
2.0
OPERATE & PROD
2.0
VALUE CREATION
2.0
TSR (SHARE+DIV)
2.0
$: EXP, R&D & M&A

E&P2.0 EXAMPLES

ADVANCED OIL & GAS 'MANUFACTURING' MINDSET

- Standardization
- Industrialization
- Automation…
- E&P ala Southwest Airlines

COLLABORATION2.0

- = Darwin's Blindspot
- A new competitive advantage
- Business is not always 'war'
- In the future, the fittest are the best collaborators?
- Industry-Suppliers-Academia

DRILLING AUTOMATION =TNBT?

- 'Watson' and 'Deep Blue' are better and safer drillers
- Materials Science; lighter
- Safer with new technology (digital assistant – lifting)

THE INDUSTRIAL INTERNET OF EVERYTHING, BIG DATA, ANALYTICS

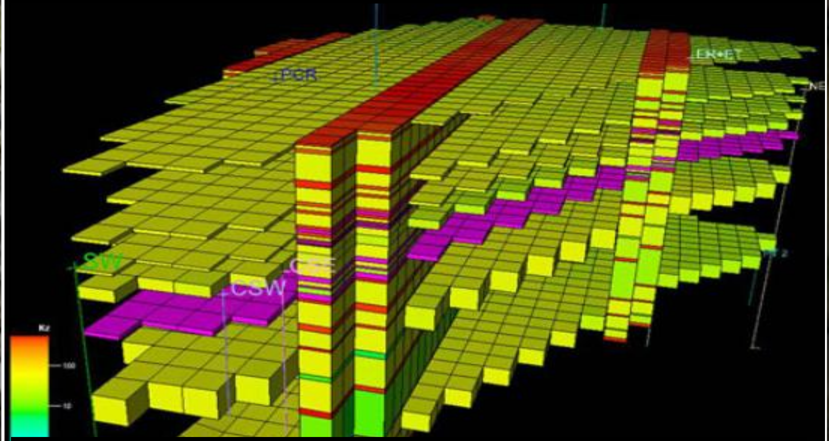
- Exploration (the signature of 'elephants' in the data)
- Operations: optimization of production

NEW BUSINESS MODELS EXAMPLE: OFFSH DRILLING RIGS

- Rig owners have skin in the game: X% of disc. value?
- Rig rate=f(oil price)?
- BOBs: Leased from GE?

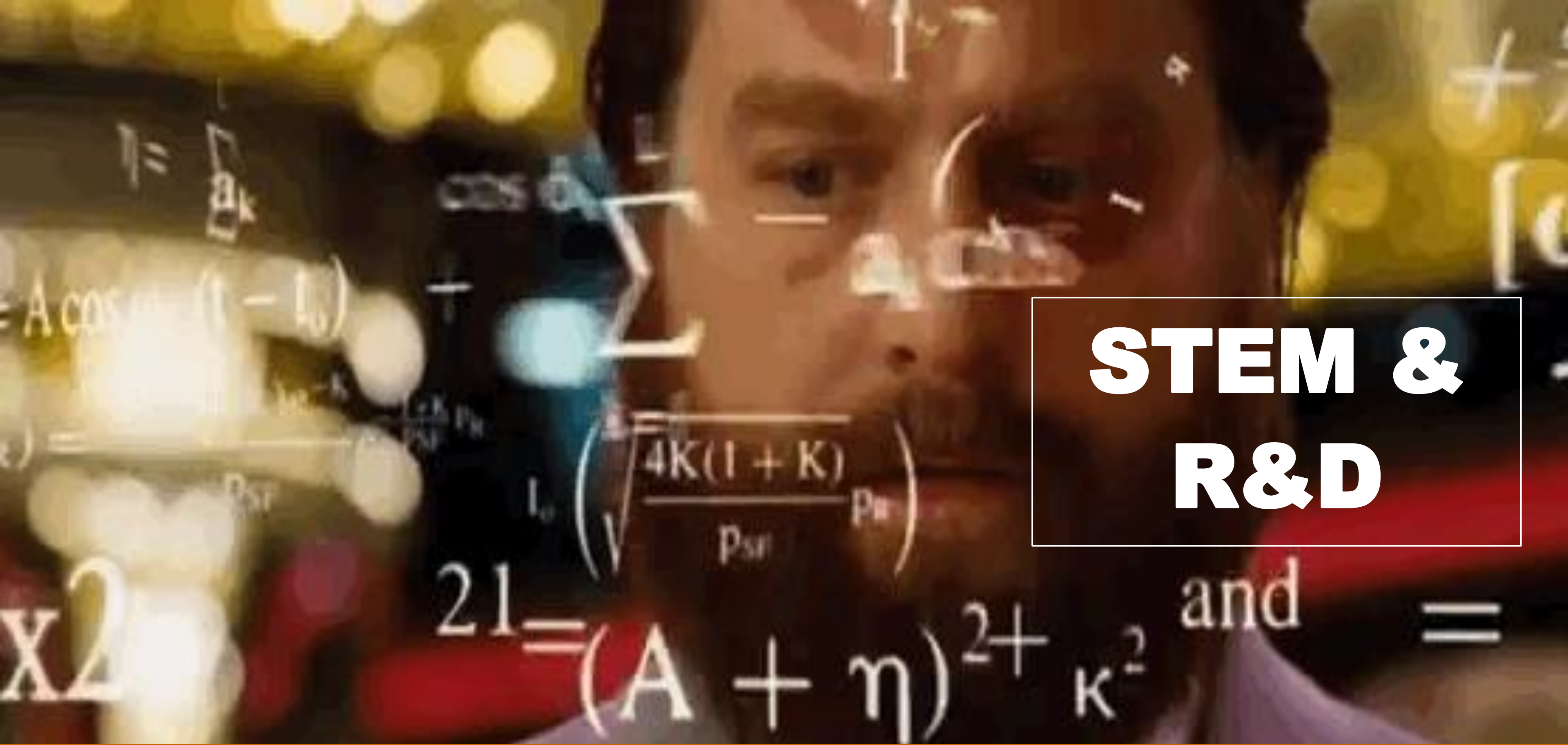
RE-BALANCE GOV TAKE vs INV TAKE

MORE REALISTIC ‘PLUMBING SYSTEMS’



MORE REALISTIC FORECASTS & MORE VALUE CREATION

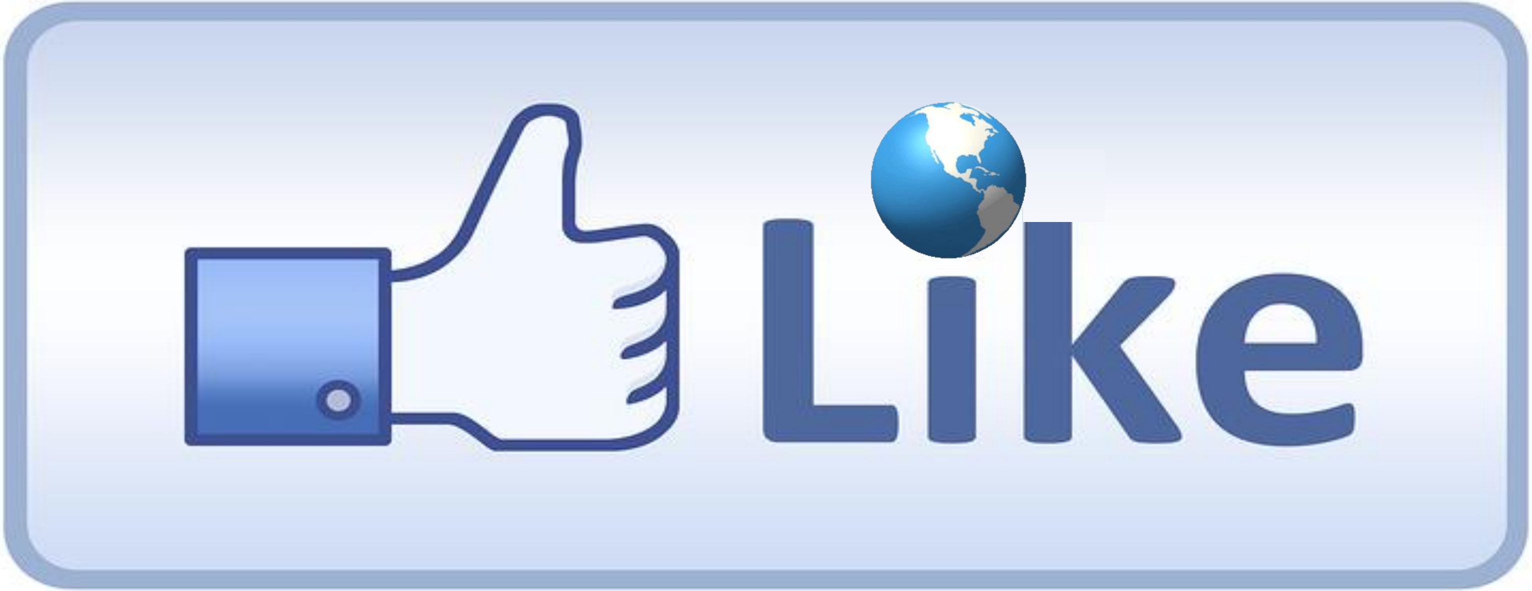
Source: Ross Formation Turbidite System, West Ireland



STEM & R&D

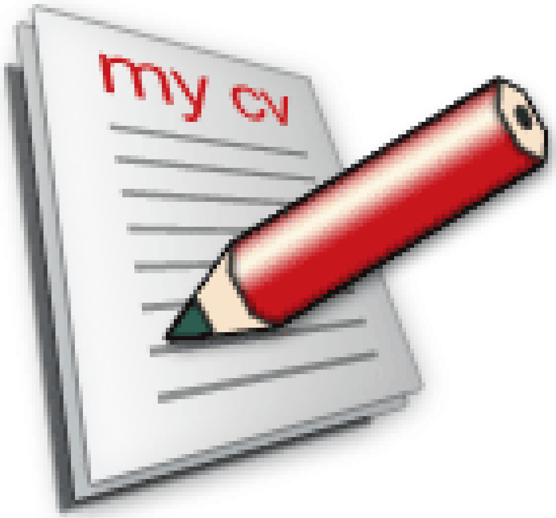
- **Make the impossible *possible***
- **Make the impossible *affordable***

LOOKING BACK AT E&P1.0 IN 10 YEARS?

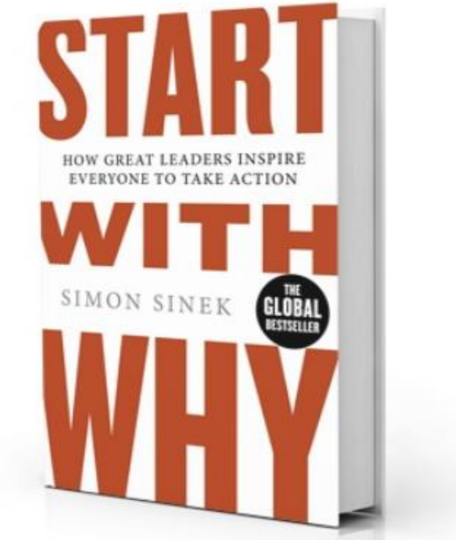

Like

WE'RE TEAMING UP

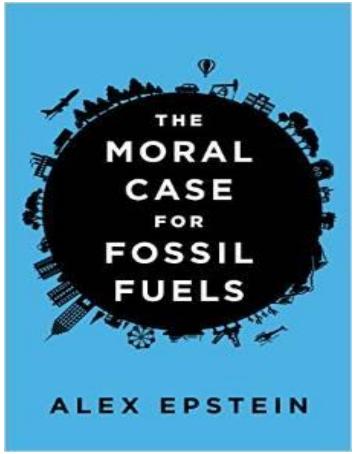
Global E&P Investment: 700-1000 Billion/Yr



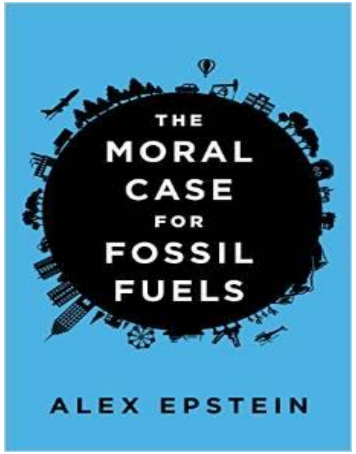
YOU HAVE **'CHANGING THE WORLD FOR THE BETTER'** IN YOUR JOB DESCRIPTIONS !



THE MORAL CASE FOR E&P

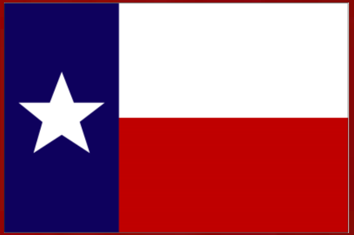


If we look at the big picture of fossil fuels (which provide 85% of the global energy supply in 2016) compared with the alternatives, the overall impact is to make the world a far better place



2016 ENERGY SUPPLY FROM SOLAR, WIND AND GEOTHERMAL <2%

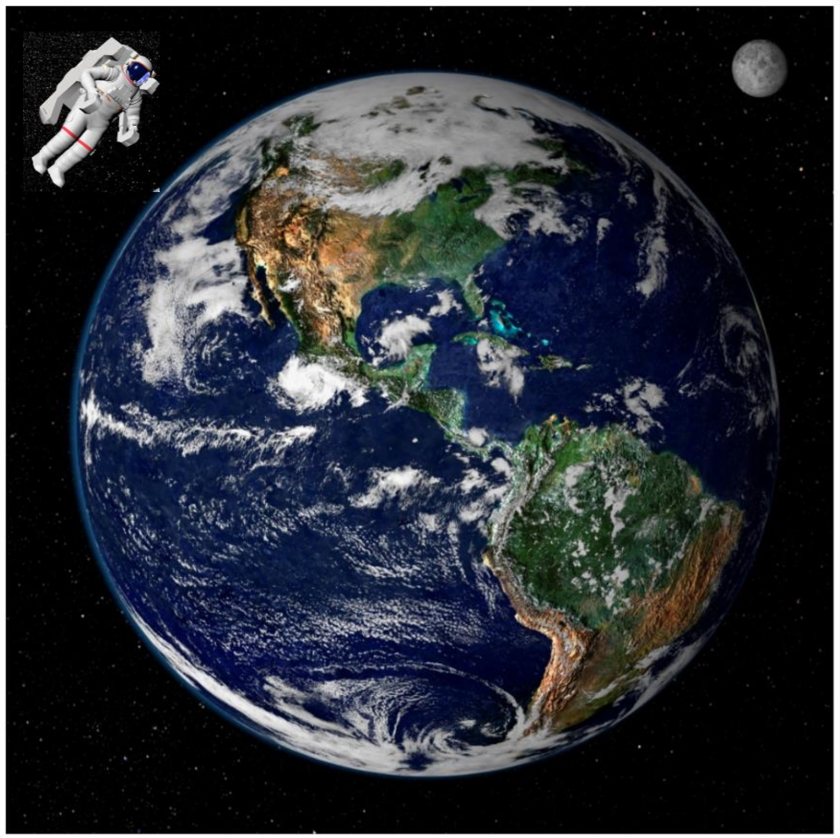
60 MINUTES

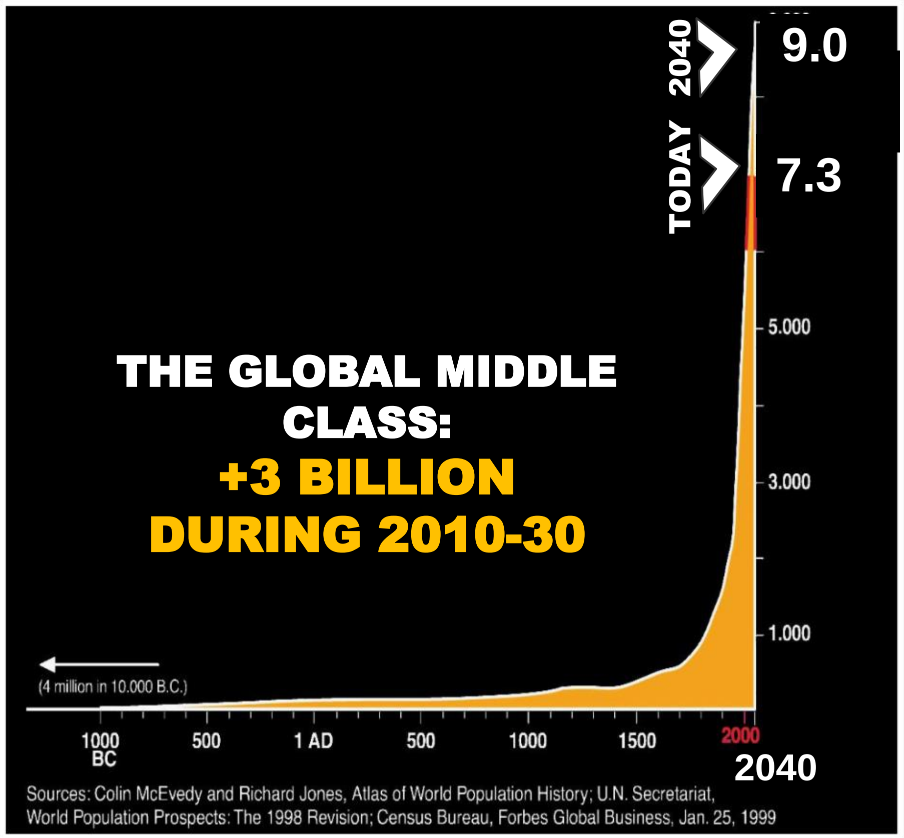


27 million new energy customers in 112.5 DAYS

Mini Quiz ?

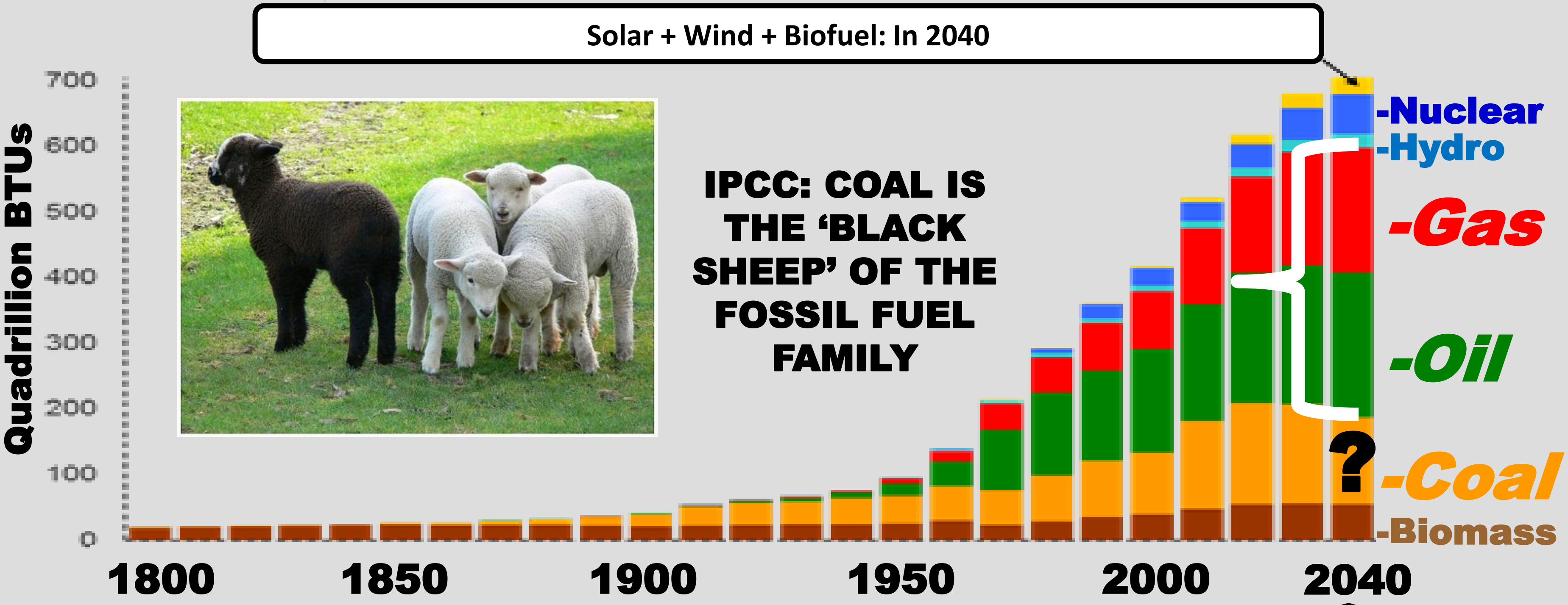
SPE International





Sources: UN, ExxonMobil

GLOBAL ENERGY MIX TO 2040



Source: ExxonMobil The Outlook For Energy – A View To 2040

THE NEW ECONOMICS OF OIL

Concerns over running out of oil and gas have disappeared. There is no intrinsic reason why oil prices should be going up due to a perception of a limited supply of oil. By the time we stop using oil due to peak demand, there will still be trillions of barrels left

Source: BP Technology Outlook 2015

RENEWED FOCUS ON

CLIMATE CHANGE

IPCC:

<+2degC^0

OR ELSE

SPE International

G7 leaders agree to phase out fossil fuel use by end of century

German chancellor Angela Merkel announces commitment to 'decarbonise global economy' and end extreme poverty and hunger

84

YEARS TO GO

PARIS2015

UN CLIMATE CHANGE CONFERENCE

COP21·CMP11

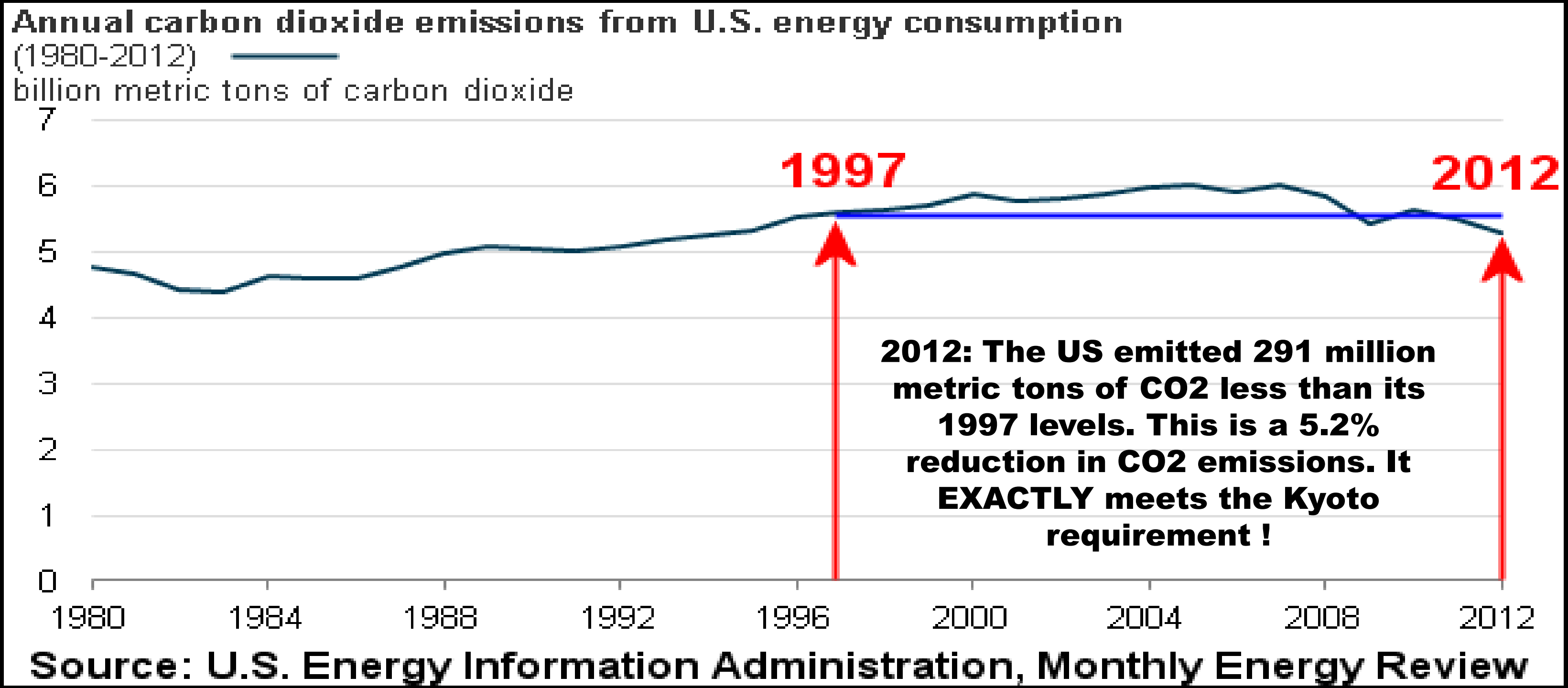
SPE International

<+2degC

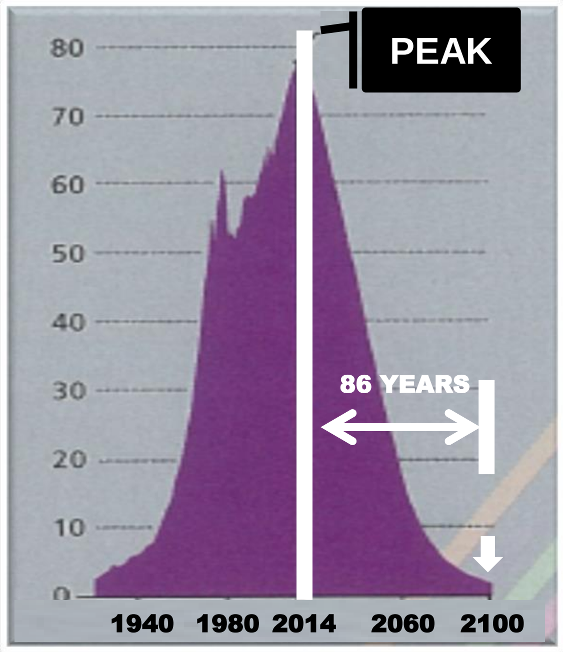
E&P IS A BIG PART OF THE SOLUTION !!

- E&P provides energy while we develop substitutes
- E&P keeps lifting people out of poverty until substitutes can take over
- Use natural gas instead of coal for electricity generation
- Minimize CO_2 emitted per boe produced (no flaring, ..)
- Use natural gas in combination with intermittent renewables (wind, sun, tidal,..)
- IOR with CO_2
- CCS

This Week in History: February 16-19



Source: Scientific American Special Publication:
'The End', September 2010

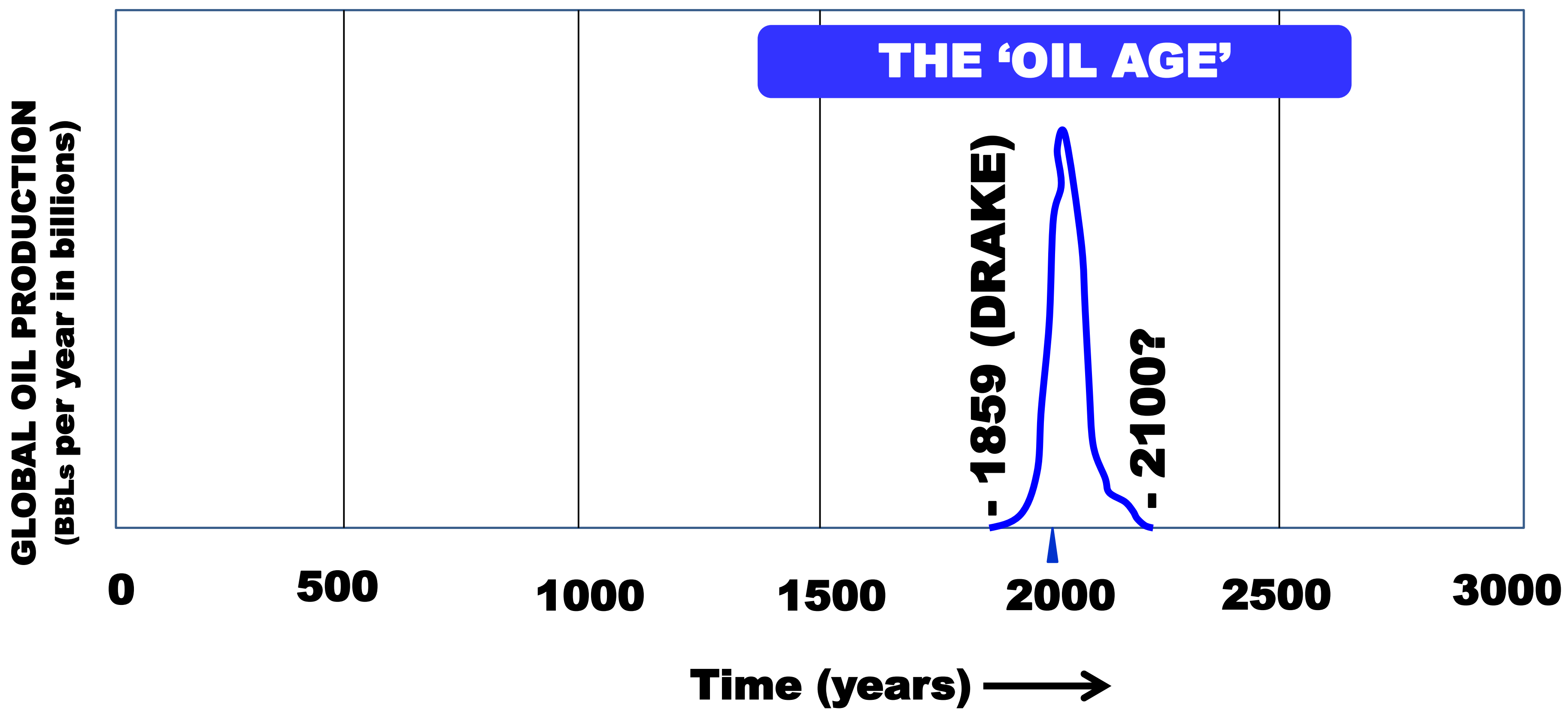


SO WHEN DO WE STOP USING OIL?

- ❑ The oil age will not end because we ran out of oil
- ❑ The stone age did not end because we ran out of stones
- ❑ Commercial sailboats did not stop sailing because we ran out of wind

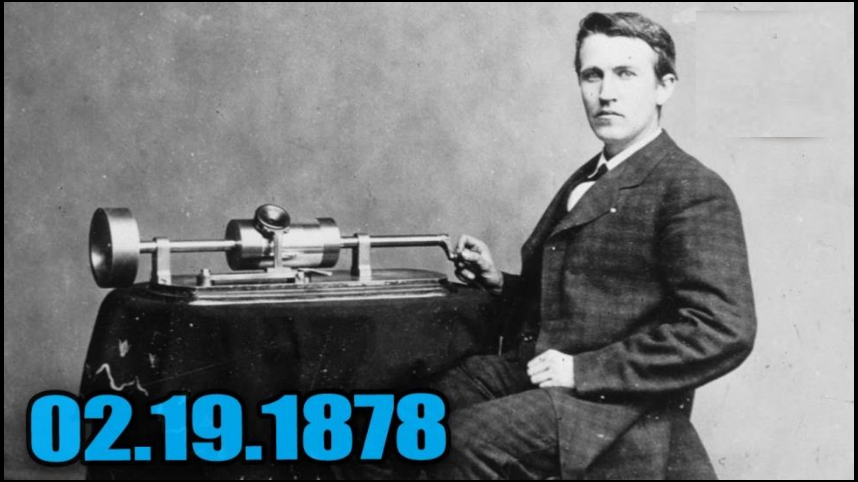
- ❑ The oil age will end because
  - oil became too expensive
  - alternatives became more attractive and/or
  - climate issues made it imperative
- ❑ Note: There are always surprising upsides in endings - for The Next Big Thing - while The Next Old Thing is doomed


NATURAL GAS
Current (High-carbon) Energy Mix
Future (Low-Carbon) Energy Mix
CEOs OF EUROPEAN IOCs
• COAL IS THE 'BLACK SHEEP' OF THE FFF
• NATURAL GAS IS THE SUBSTITUTE
• BOOST NATURAL GAS USE
• INTRODUCE A GOBAL CO2 TAX ASAP
SPE International



THE 'OIL AGE'
GLOBAL OIL PRODUCTION
(BBLs per year in billions)
- 1859 (DRAKE)
- 2100?
0
500
1000
1500
2000
2500
3000
Time (years)

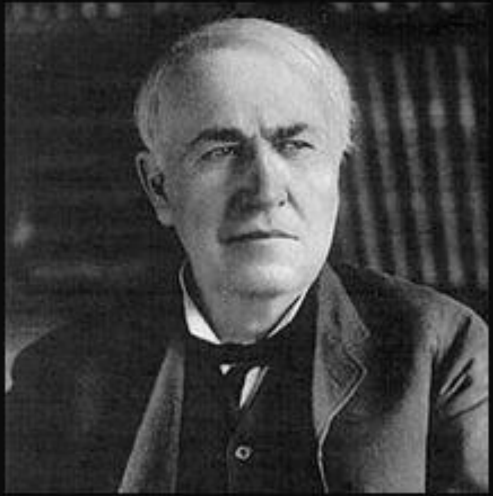
This Week in History: February 16-19



February 19, 1878

Thomas Edison patents the gramophone

Thomas A. Edison



I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait til oil and coal run out before we tackle that.

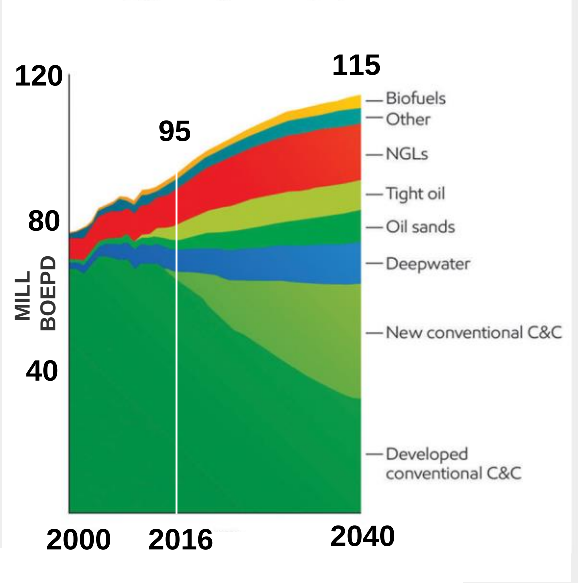
[redacted]

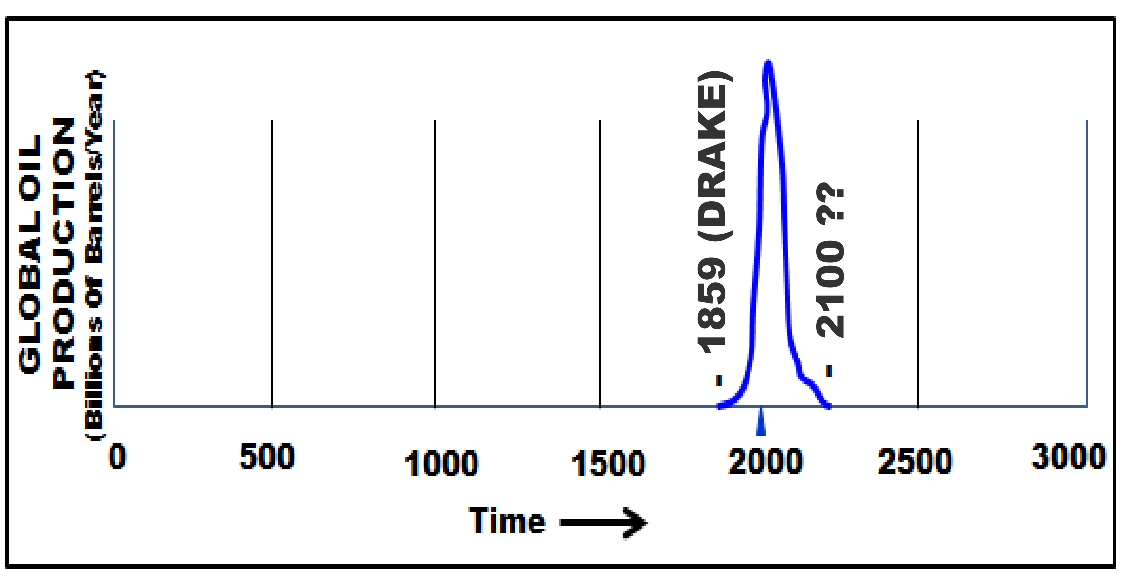
THOUGHT NO.1:

THOUGHT NO.2:

THE NEAR LONG TERM

THE FAR LONG TERM





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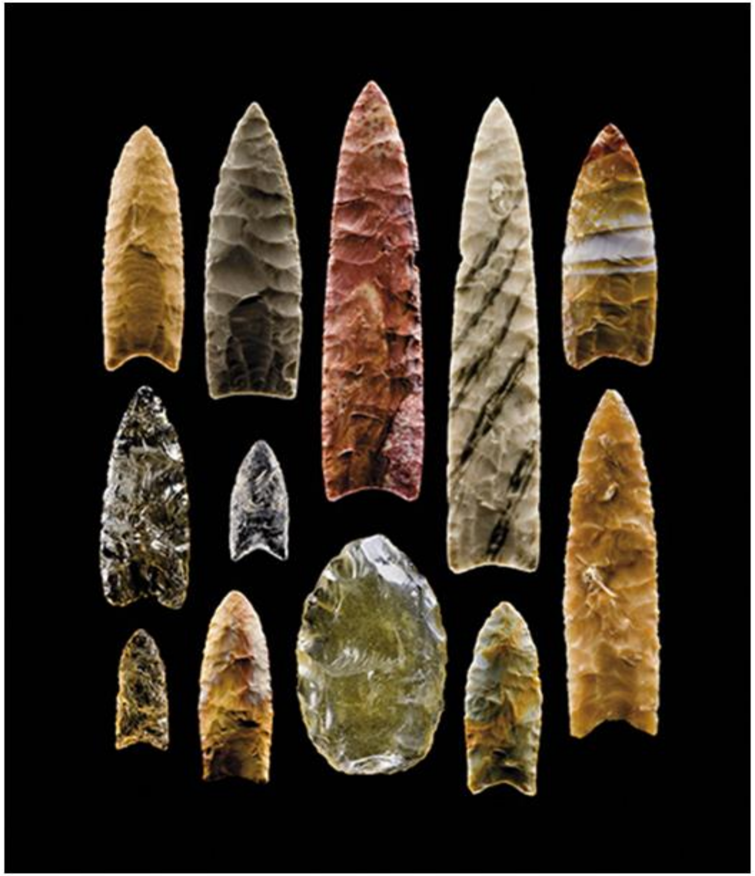
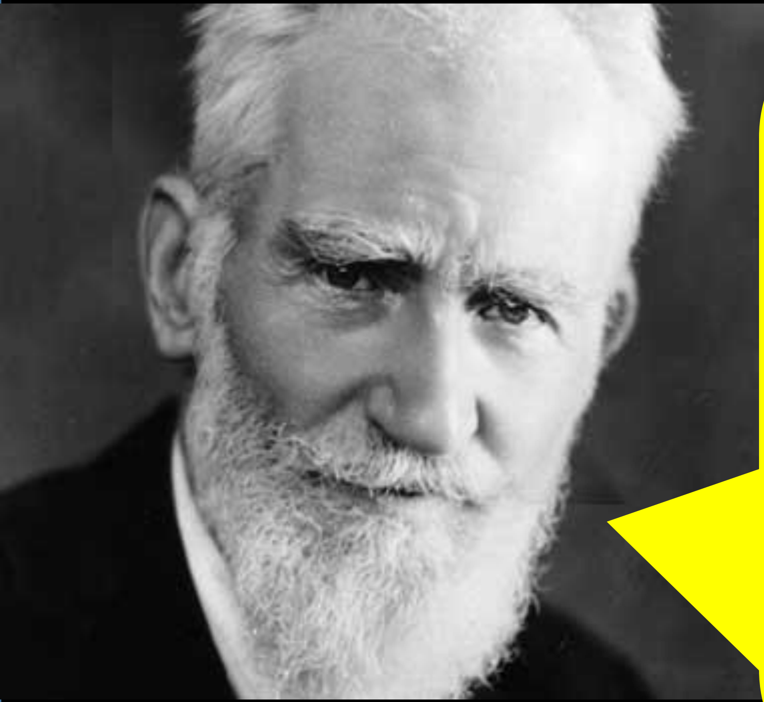
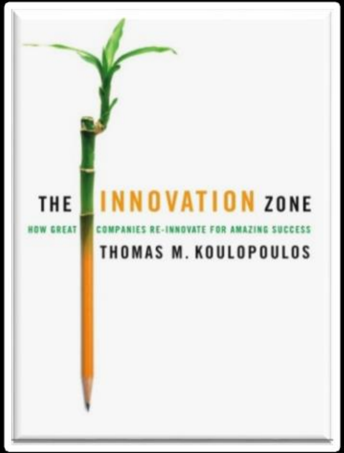


SPE International



Some people see what is and say, WHY?
I dream things that never were and say, WHY NOT?

George Bernhard Shaw



“ Mankind’s ability to innovate, adapt and change is ultimately the most encouraging and optimistic aspect of human nature! "

This Week in History: February 16-19


PARTRIDGE-KELLER TRACTOR BIPLANE - CICERO FLYING FIELD - 1913
JOSEPH BEST AT THE CONTROLS - POSSIBLY THE LE GAUCIER MONOPLANE TO THE REAR
- CARROLL F. GRAY AERONAUTICAL COLLECTION (EX: PAUL MATT)

February 16 1914

First airplane flight between LA and San Francisco

LORD KELVIN

1885:

" I CAN STATE FLATLY THAT HEAVIER THAN AIR FLYING MACHINES ARE IMPOSSIBLE "


OIL
impossible

This Week in History: February 16-19

February 17
1878

In San Francisco, the first large city telephone exchange opened

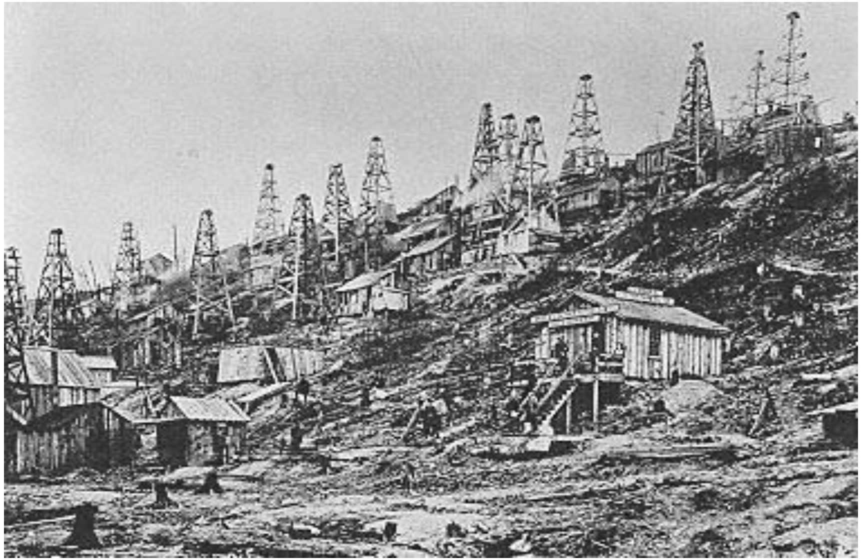
THE CREATIVE DESTRUCTION OF THE TELEPHONE 1876-2016

Alexander Graham Bell
1876

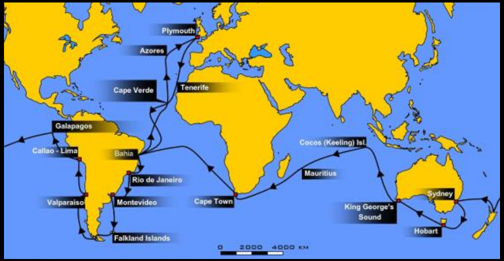
Martin Cooper, Motorola
1973

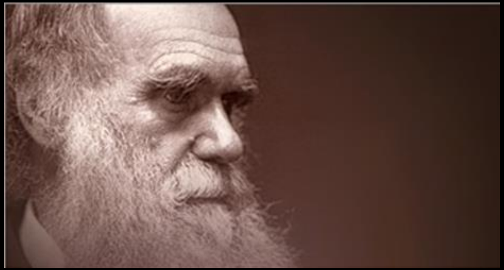
Apple iPhone
2016

E&P: THEN vs NOW



This Week in History: February 16-19

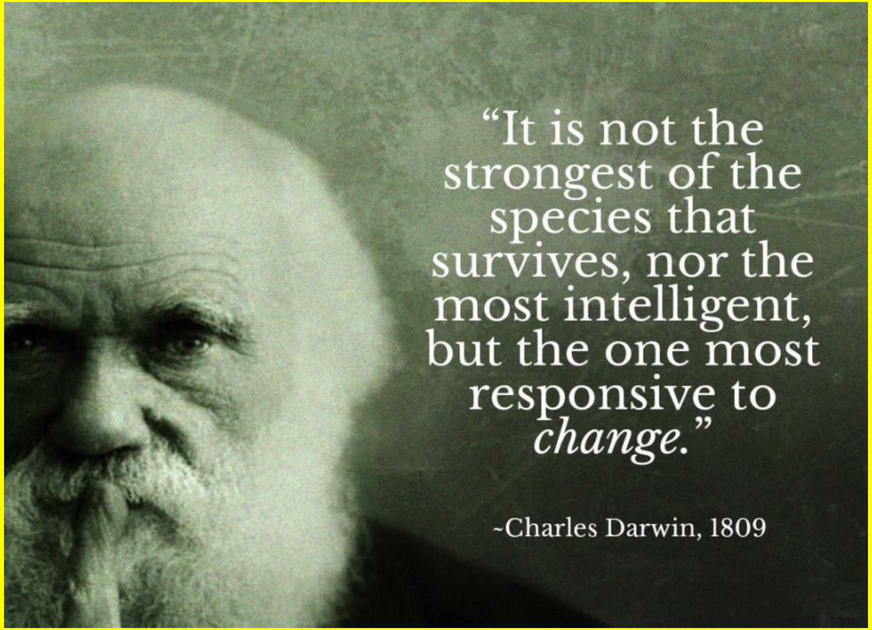


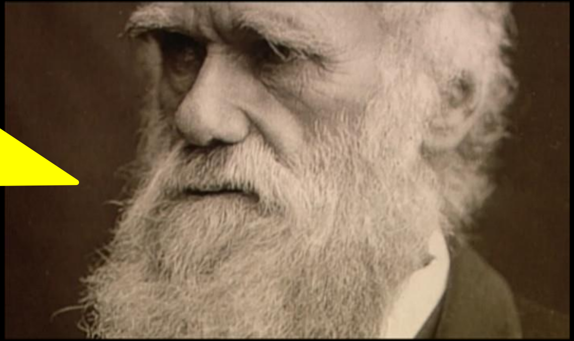


February 16 1832

HMS Beagle reaches St. Paul's Rock (Brazil)

DARWIN'S MAIN TAKEAWAY



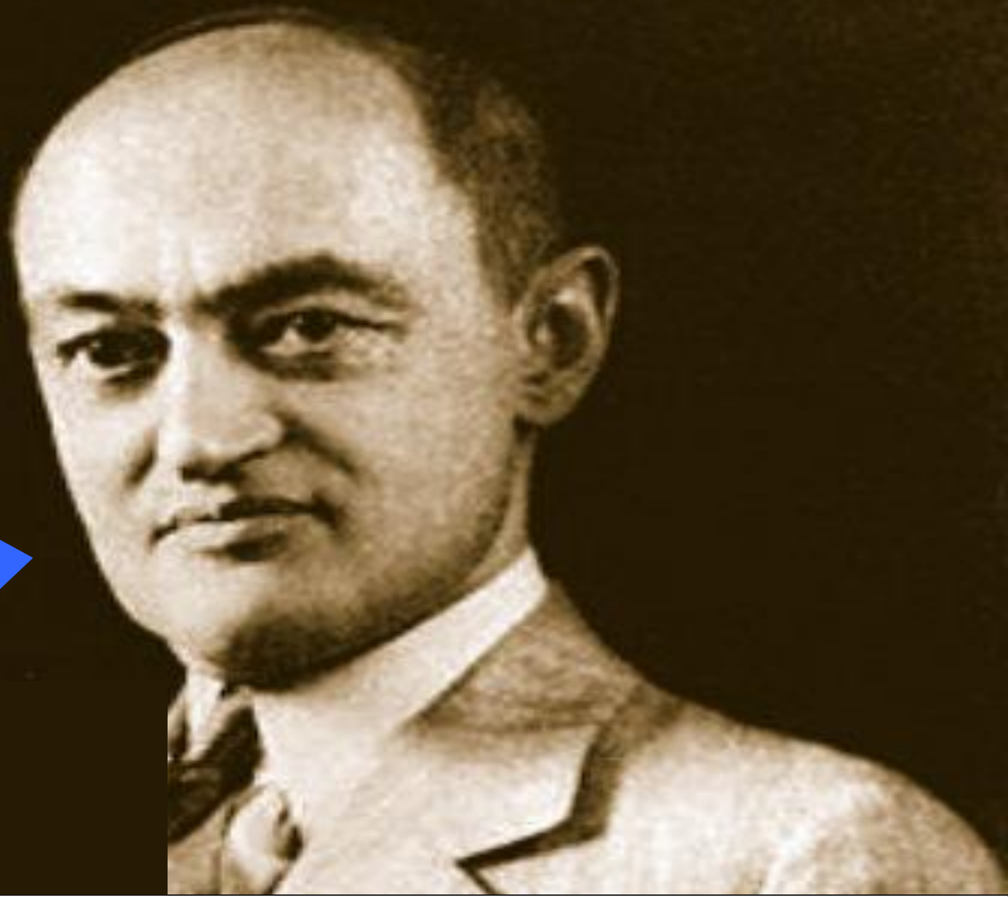


JANUARY 12, 1836

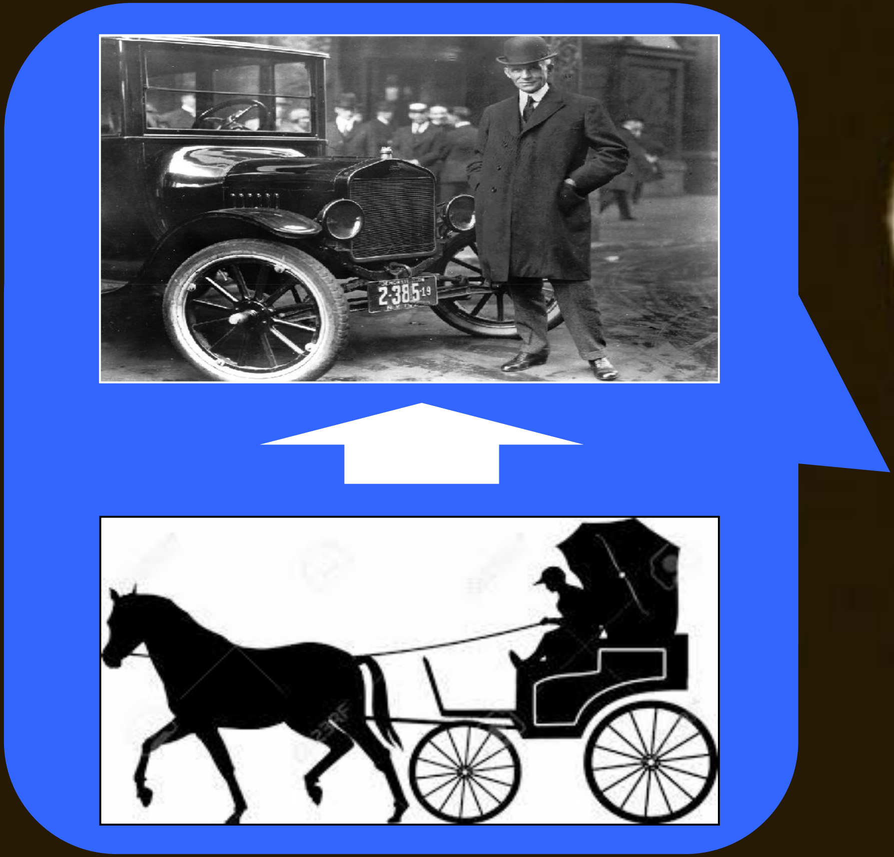
HMS BEAGLE WITH CHARLES DARWIN REACHES SYDNEY AUSTRALIA

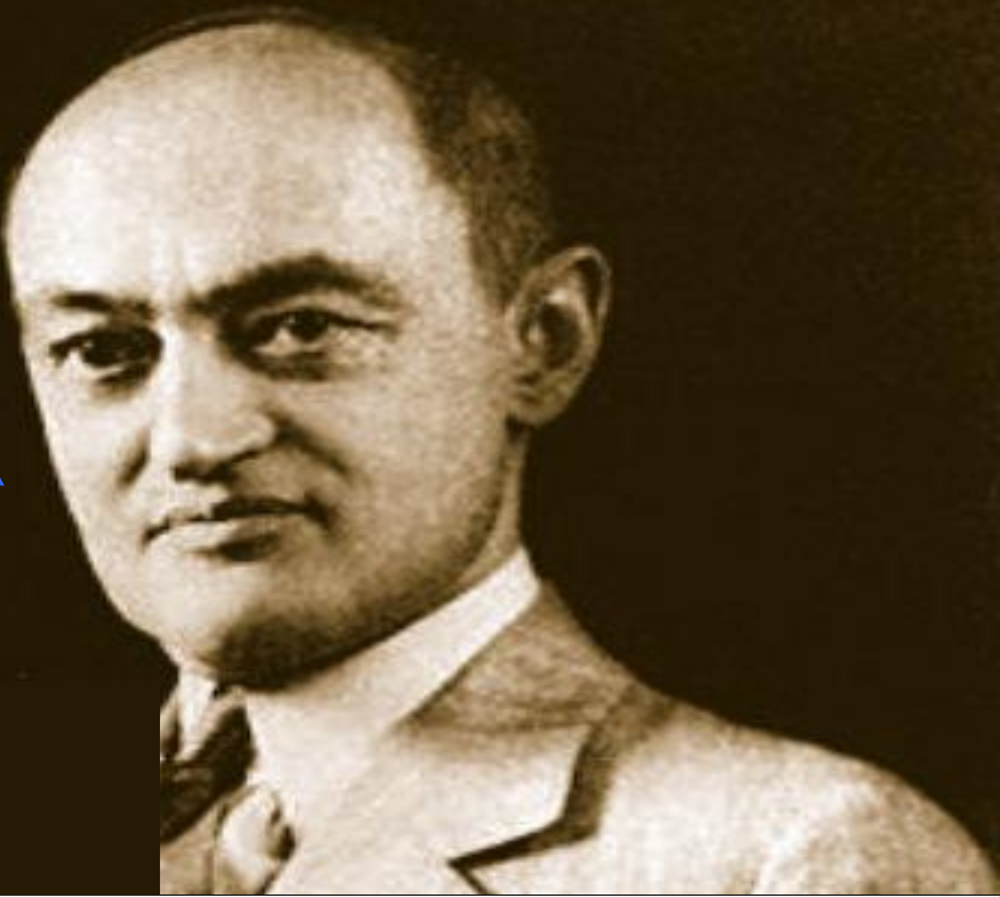
JOSEPH SCHUMPETER

CREATIVE DESTRUCTION



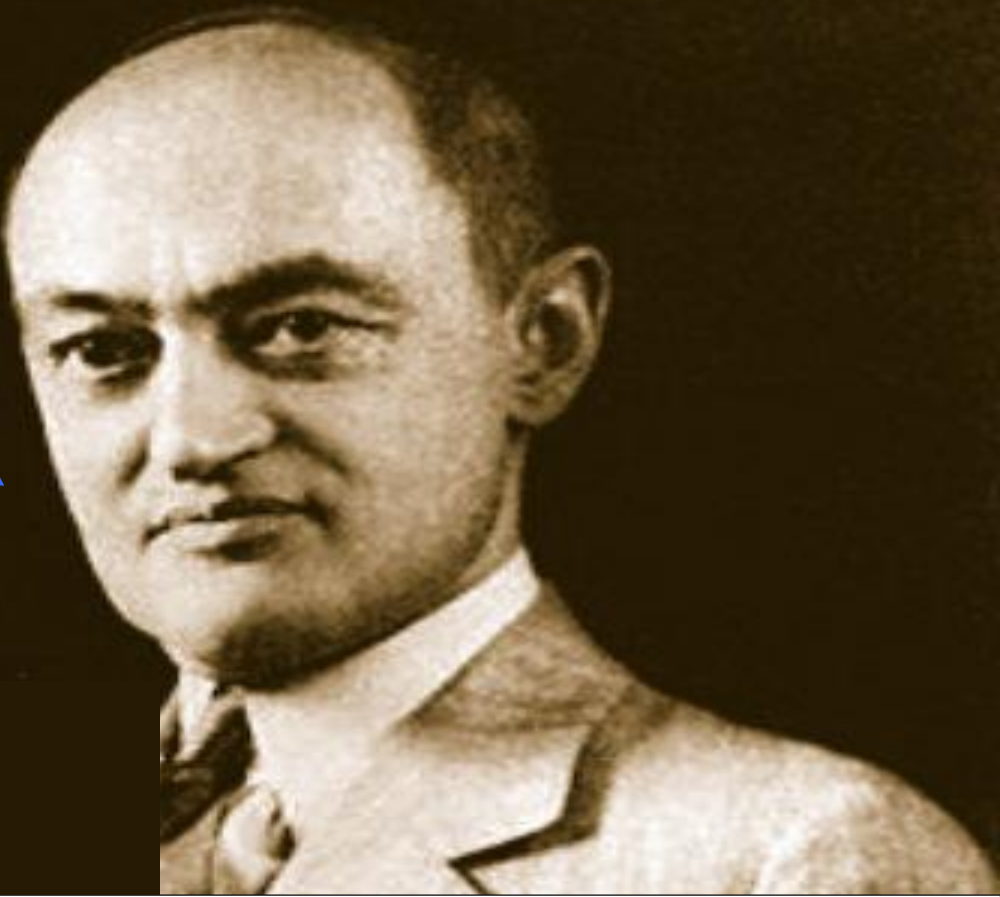
The process in which technology and innovation create new ways of doing things and, in the process leave the old ways behind






If I had asked people what they wanted, everybody would have said:
A FASTER HORSE!
2-385-19


UBER
YELLOW
-703-
534-1111
YELLOW
CAB
FAIRFAX



This Week in History: February 16-19

February 17
1996

World Chess Champion Kasparov beats IBM's Supercomputer 'Deep Blue'

DEEP BLUE BEAT KASPAROV IN NEW YORK CITY IN 1997

E&P 2.0

This Week in History: February 16-19

” Every block of stone has a statue inside it and it is the task of the sculptor to discover it “

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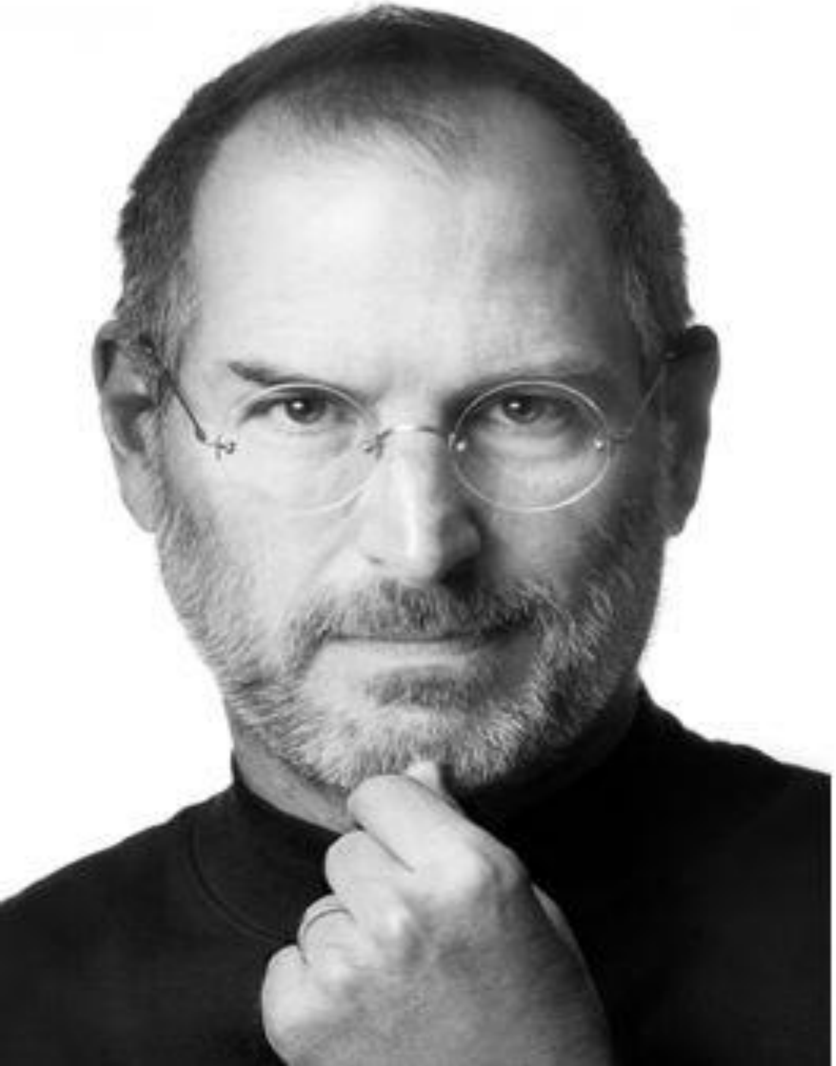
This Week in History: February 16-19

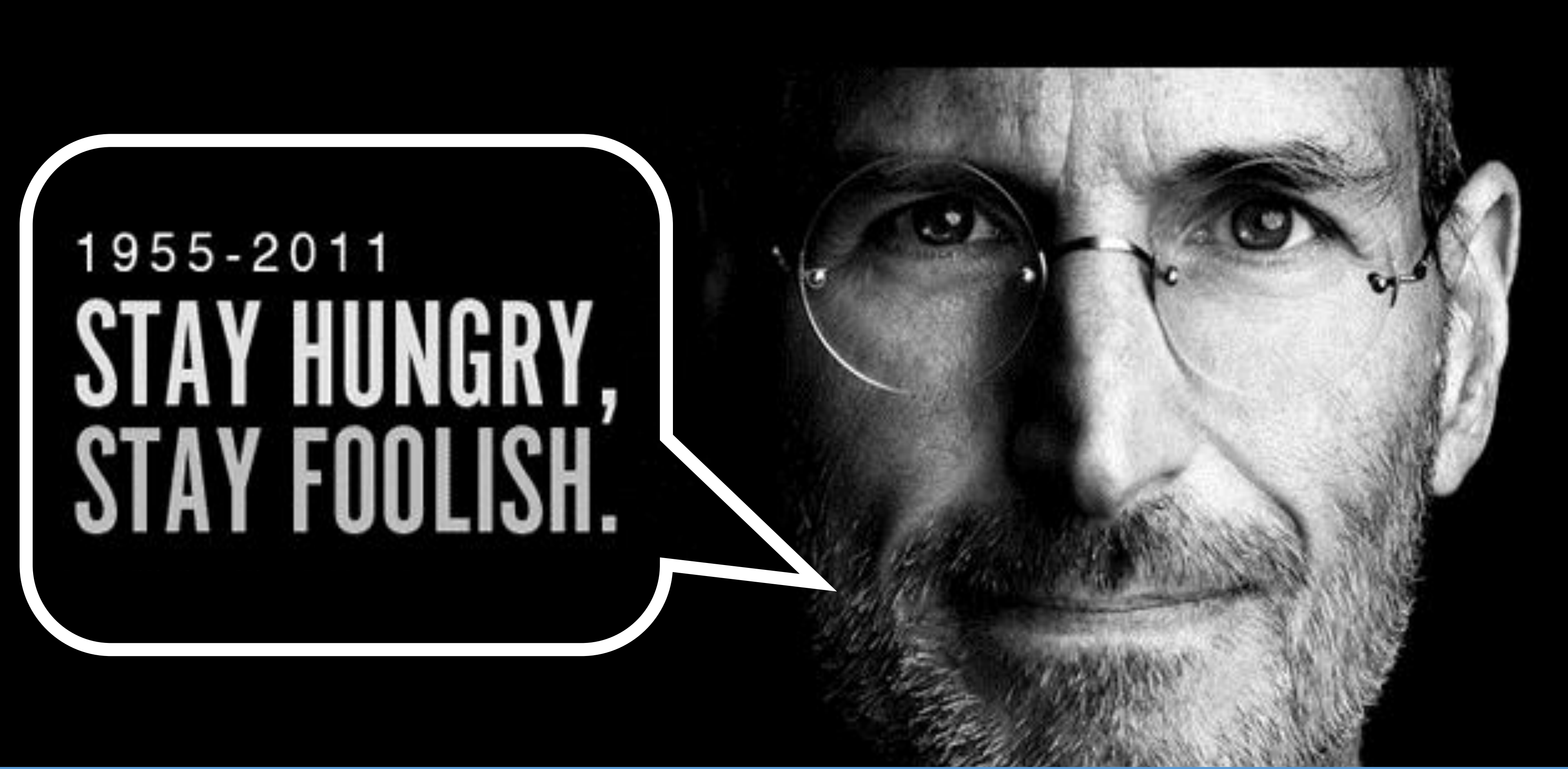
February 19,1904

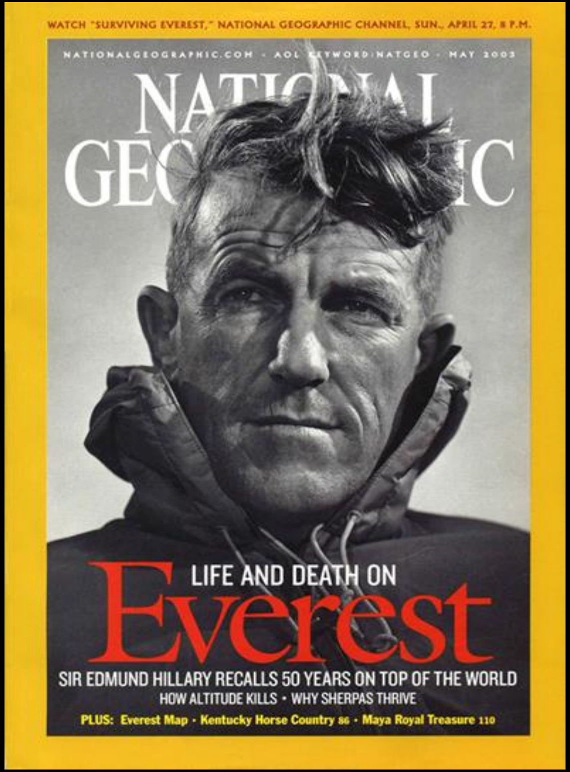
Winston Churchill makes one of his most powerful and brilliant speeches (1.5hrs long)



"because the ones who are crazy enough to think that they can change the world, are the ones who do."

Steve Jobs (1955 - 2011)

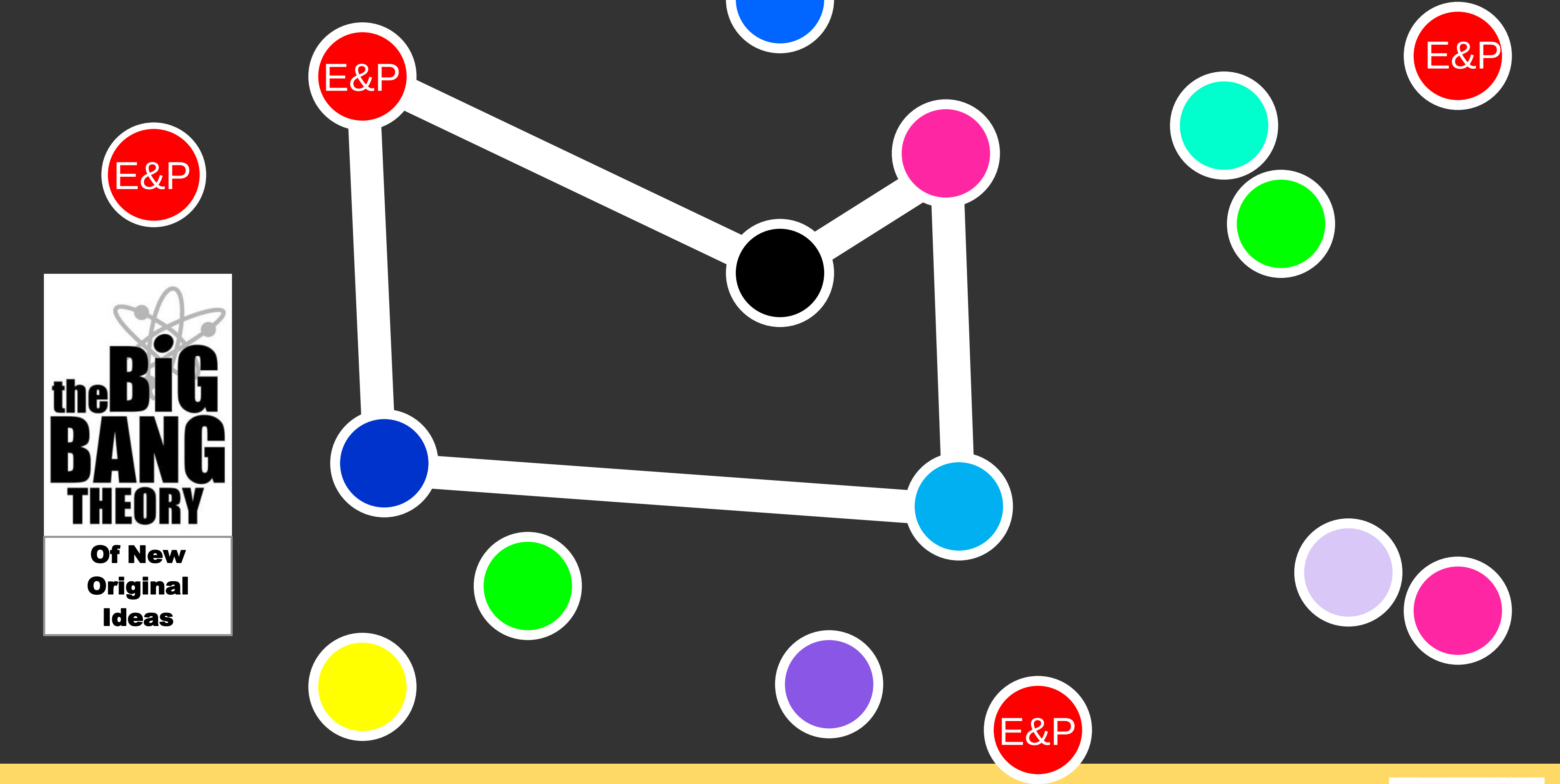

1955-2011
STAY HUNGRY,
STAY FOOLISH.



Sir Edmund Hillary

People do not decide to become extraordinary. They decide to accomplish extraordinary things.

‘ IT ALWAYS SEEMS IMPOSSIBLE UNTIL IT’S DONE ’



COLLECTING DOTS FROM VERY DIVERSE SOURCES

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DIVERSITY

IS A BUSINESS IMPERATIVE

- More ideas & more 'dots' to connect
- Speeds up innovation
- Better decisions
- Better performance
- Premium valuation
- The Fittest = The Most Diverse

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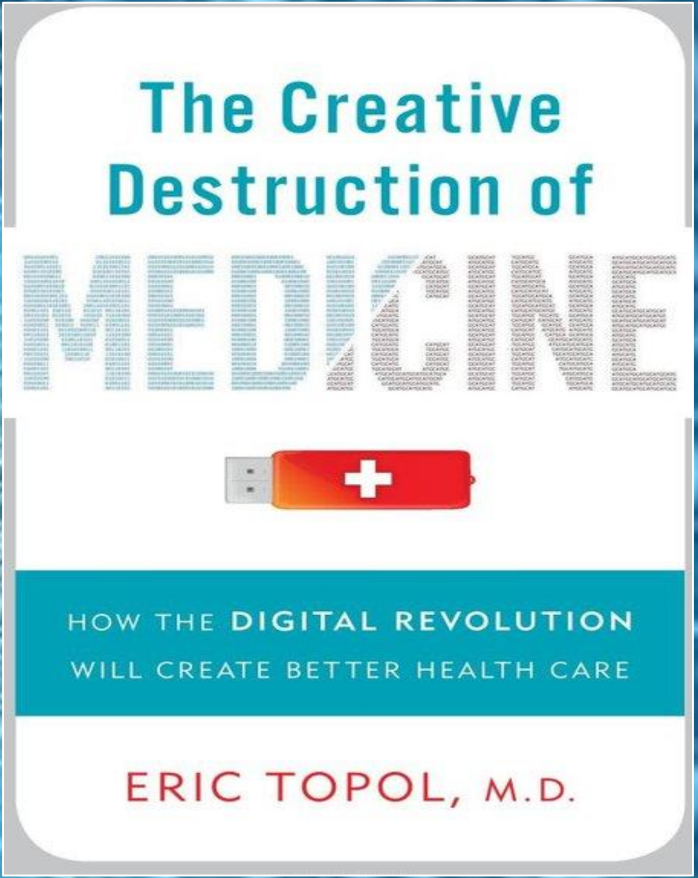
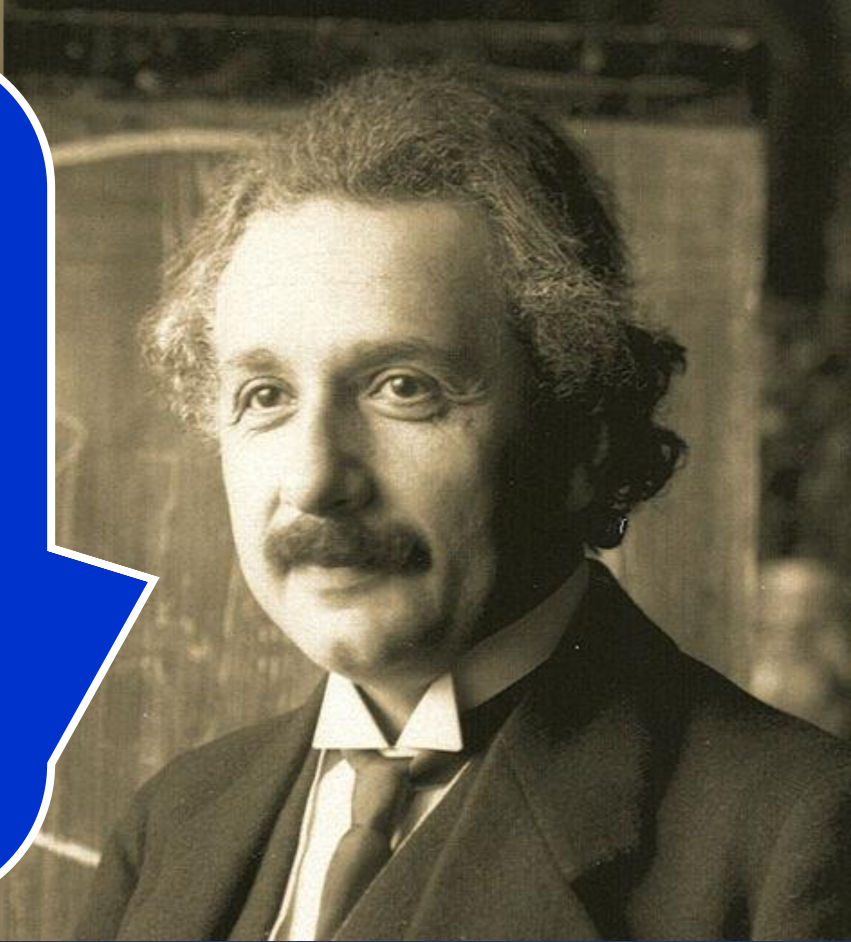


The Annual 'Pumps & Pipes Conference: Energy+Medical+Space

"Man's mind once stretched by a new idea, never regains its original dimension"

Oliver Wendell Holmes

IMAGINATION IS MORE IMPORTANT THAN KNOWLEDGE !



EINSTEIN'S DESK PHOTOGRAPHED THE DAY AFTER HIS DEATH (3.14. 1879 – 4.18. 1955)

INNOVATION =

CURIOSITY + MAKING

UNEXPECTED

CONNECTIONS

BETWEEN THINGS

- Old1
- Old2
- Old3

- New1
- New2
- New3

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THE BIGGEST DANGER ?

A FAILURE OF IMAGINATION !

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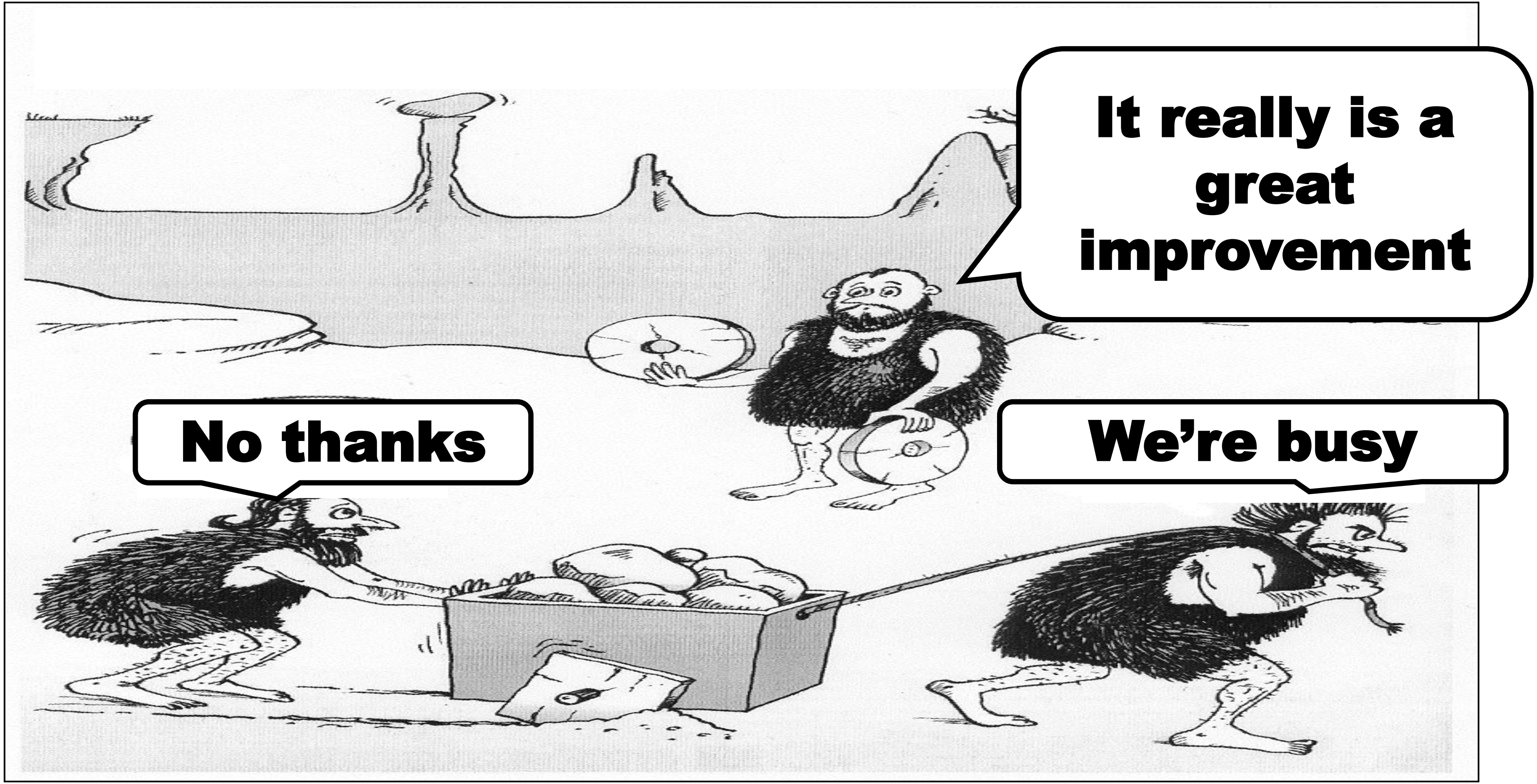
WHY NOT?


WHAT IF?


It really is a great improvement
No thanks
We're busy

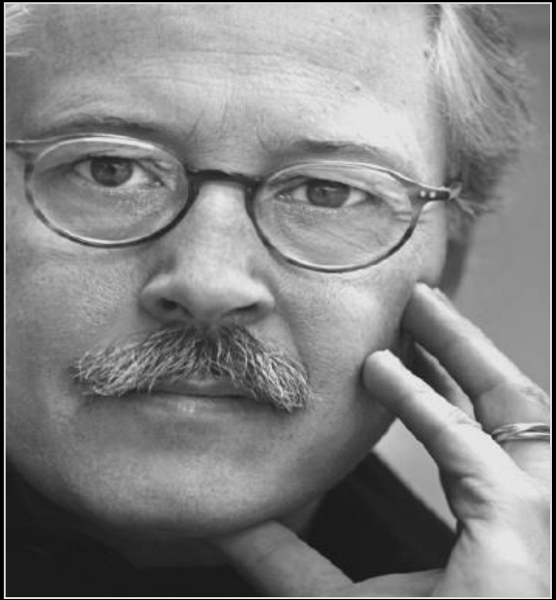
Question Posed To 1000 Successful 65-Year Old Ex-Professionals:

" Looking back over your life, what would you have done differently? "

#1

I should have taken more risks !

Source: FastCompany Magazine, Feb-March 1998 Edition, Article by Richard Leider



GARY HAMEL

Professor of Strategic Management
London Business School

- **PASSION**
- **CREATIVITY**
- **INITIATIVE**

http://www.youtube.com/watch?v=ac FI

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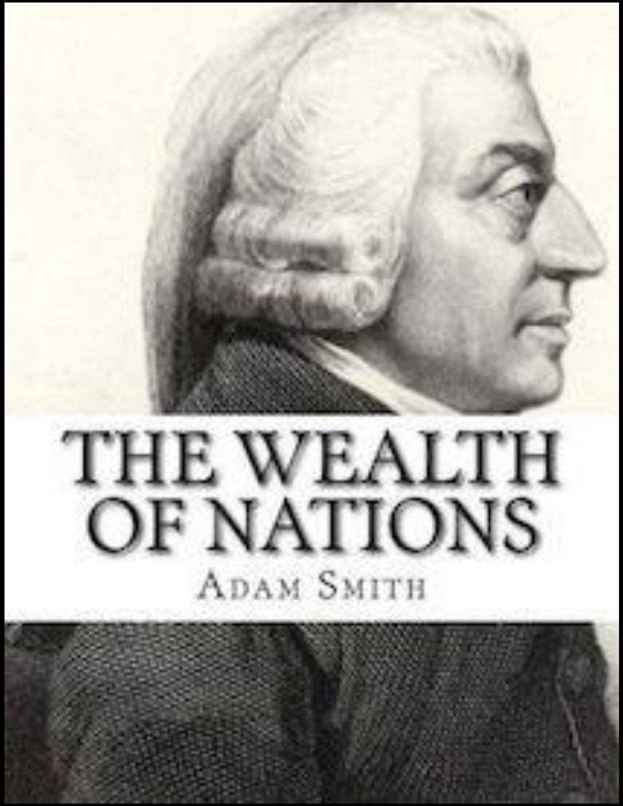
HOW CAN I BEST FRAME THE DISCUSSION ABOUT THE FUTURE OF ENERGY?

SPE International

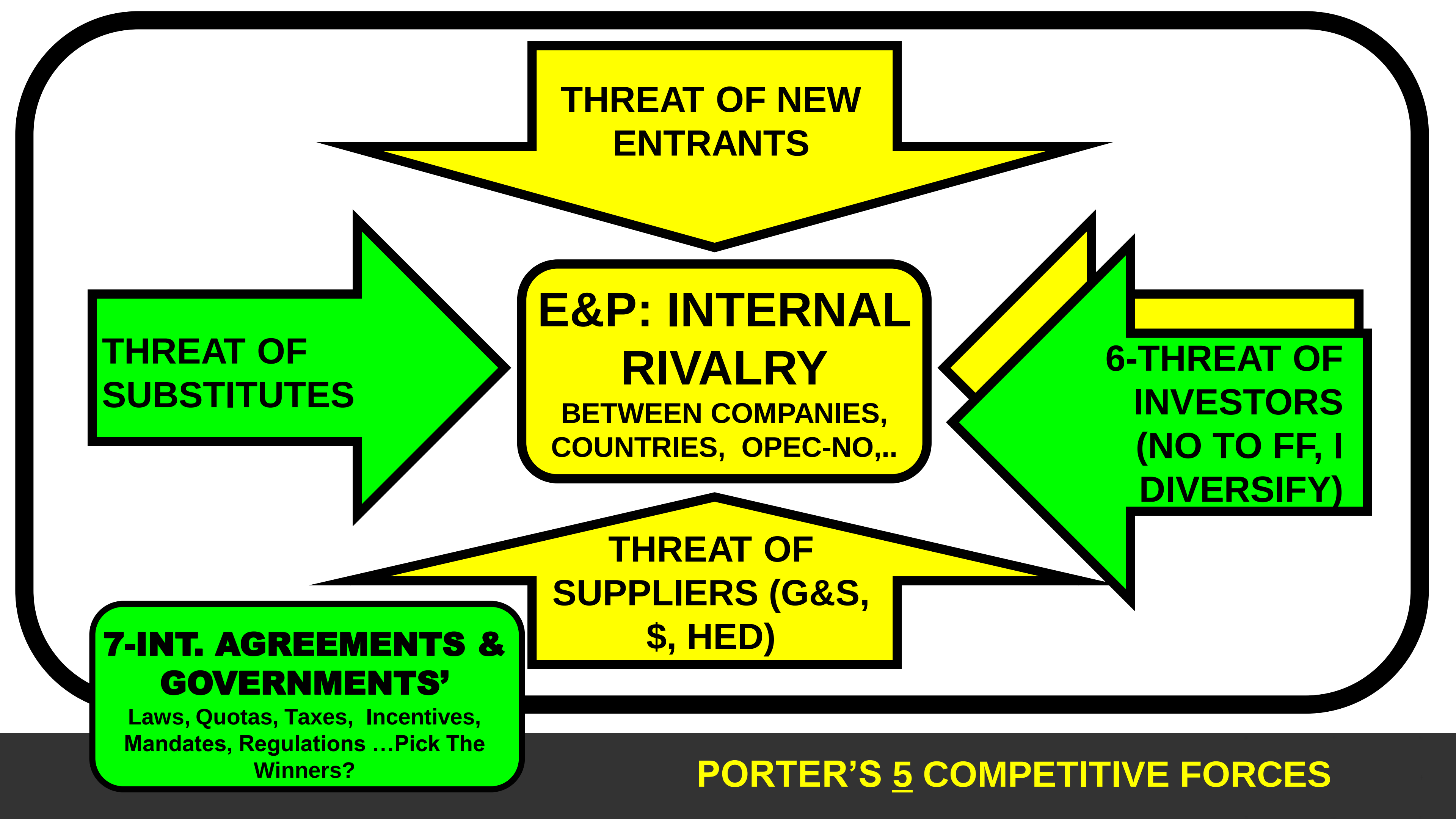
Prof. Michael Porter

Harvard Business School

Porter's 5 Competitive Forces



Are you sure this isn't the place where we should stop following the invisible hand of the market"


THREAT OF NEW ENTRANTS
THREAT OF SUBSTITUTES
E&P: INTERNAL RIVALRY
BETWEEN COMPANIES, COUNTRIES, OPEC-NO,..
6-THREAT OF INVESTORS (NO TO FF, I DIVERSIFY)
THREAT OF SUPPLIERS (G&S, $, HED)
7-INT. AGREEMENTS & GOVERNMENTS'
Laws, Quotas, Taxes, Incentives, Mandates, Regulations …Pick The Winners?
PORTER'S 5 COMPETITIVE FORCES

A LOT MORE ENERGY R&D!

- Ramp up support for research on clean – energy technologies
- Invest in clean – energy: Government, industry and university research labs
- Funding: A low carbon tax that generates $25 billion annually, but not high enough to slow the U.S. economy

Source: Ted Nordhaus & Michael Shellenberger, WSJ, Nov.29, 2010

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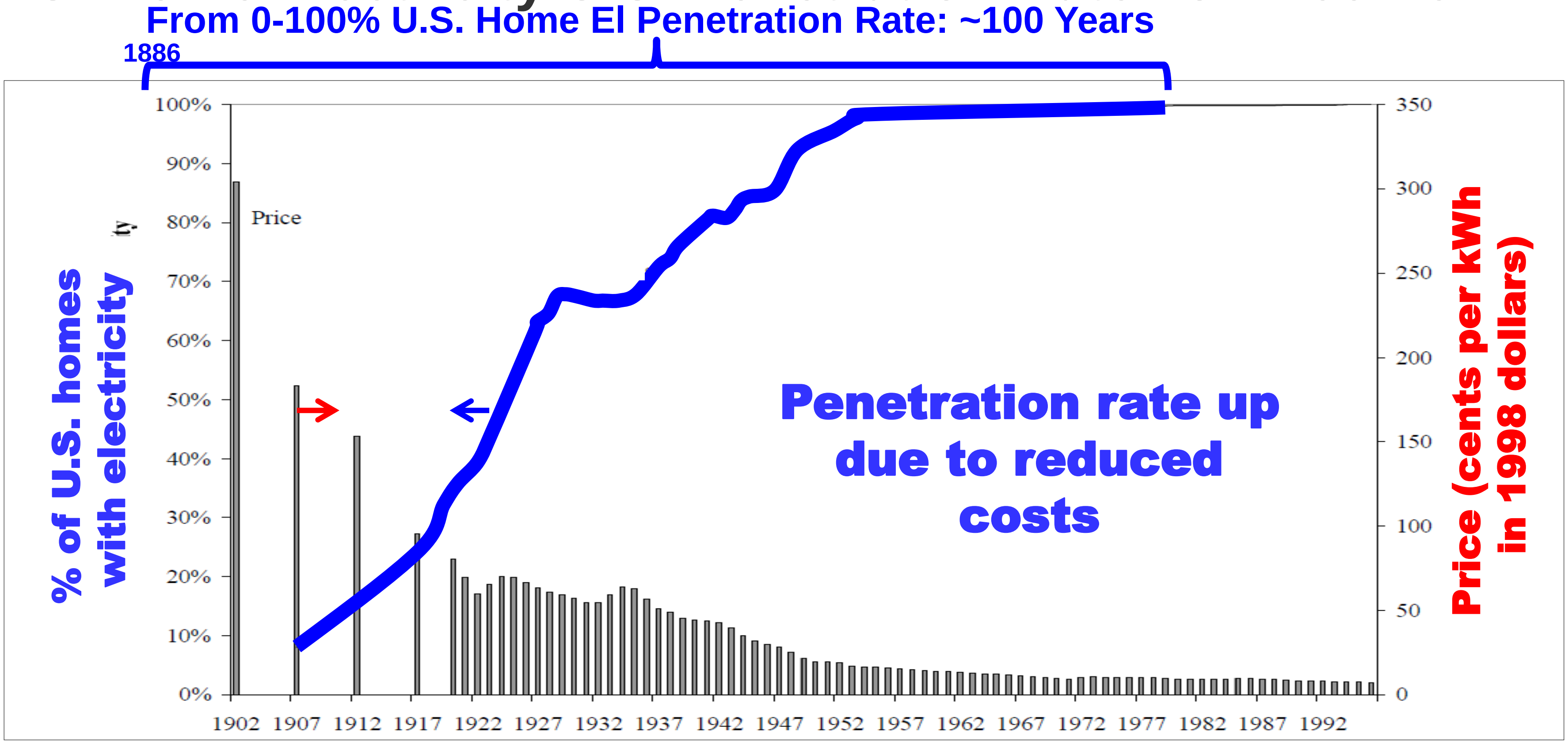
U.S. Home Electricity U.S. Penetration Rate vs Price Per kWh



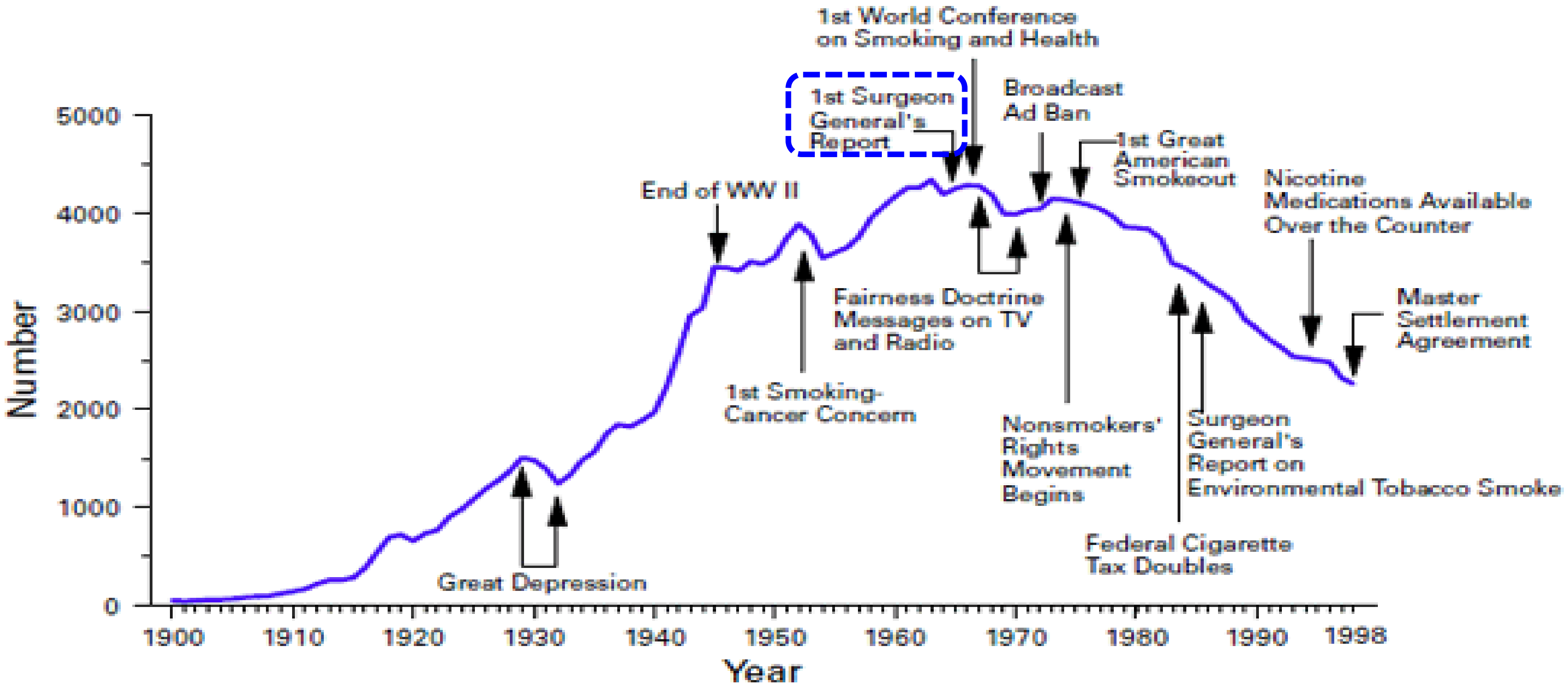
‘Peak Coal’ In London For Environmental Reasons

LONDON GREAT SMOG OF 12-1952

- 4,000-12,000 people died prematurely
- 100,000 people were made ill because of the smog's effects
- It led to The Clean Air Act (CAA) in 1956
- CAA: Coal out and only smokeless fuels allowed in cities like London

Surgeon General **Luther Terry** holds a copy of the 387-page report that connected smoking to lung cancer and heart disease on Jan. 11, 1964.

Annual Adult Per Capita Cigarette Consumption In The US



1964 - 'Peak Smoking' In The US: 42%, 2014: 18%

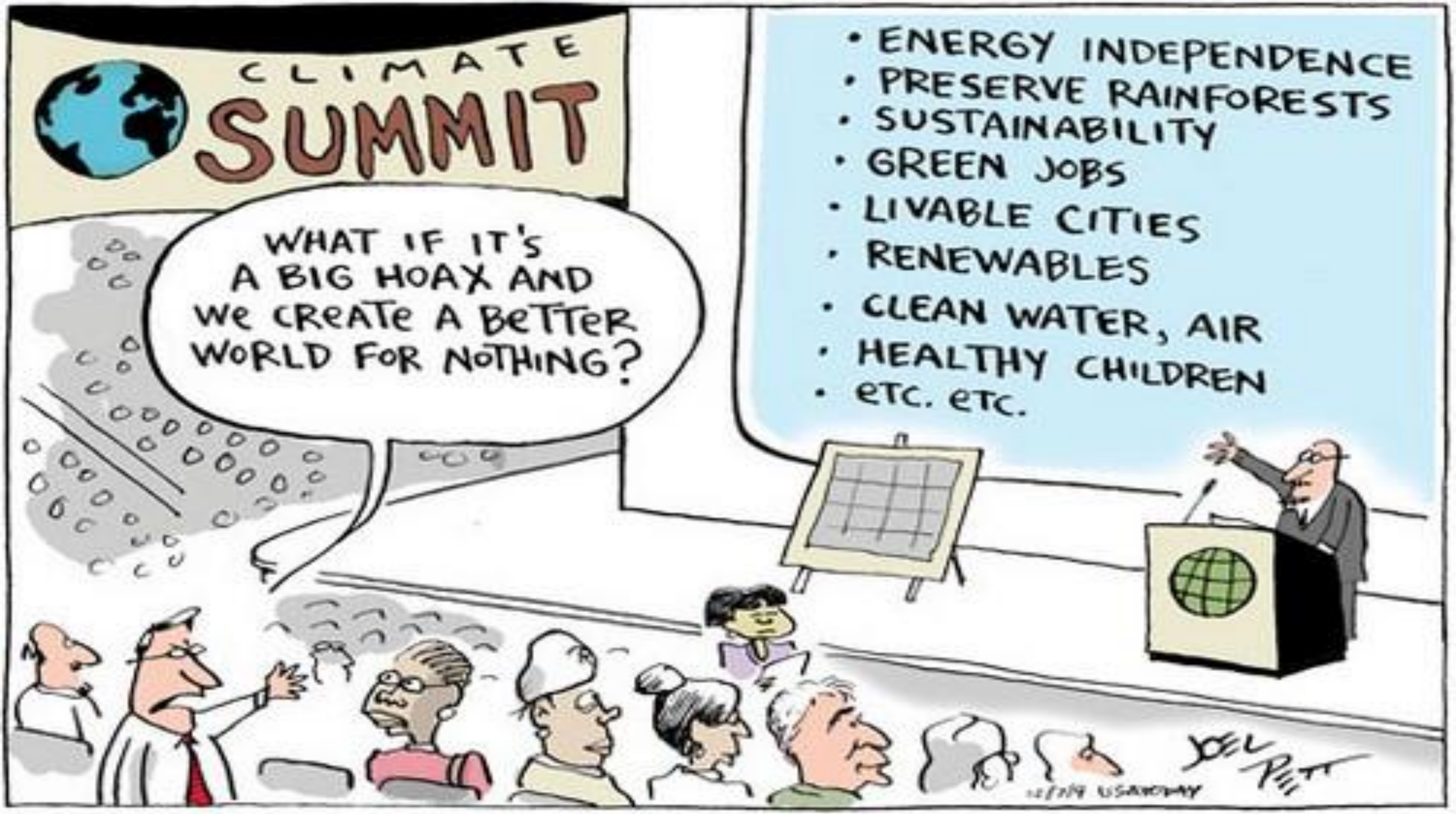
Source: US Department of Agriculture, 1986 Surgeon General's Report

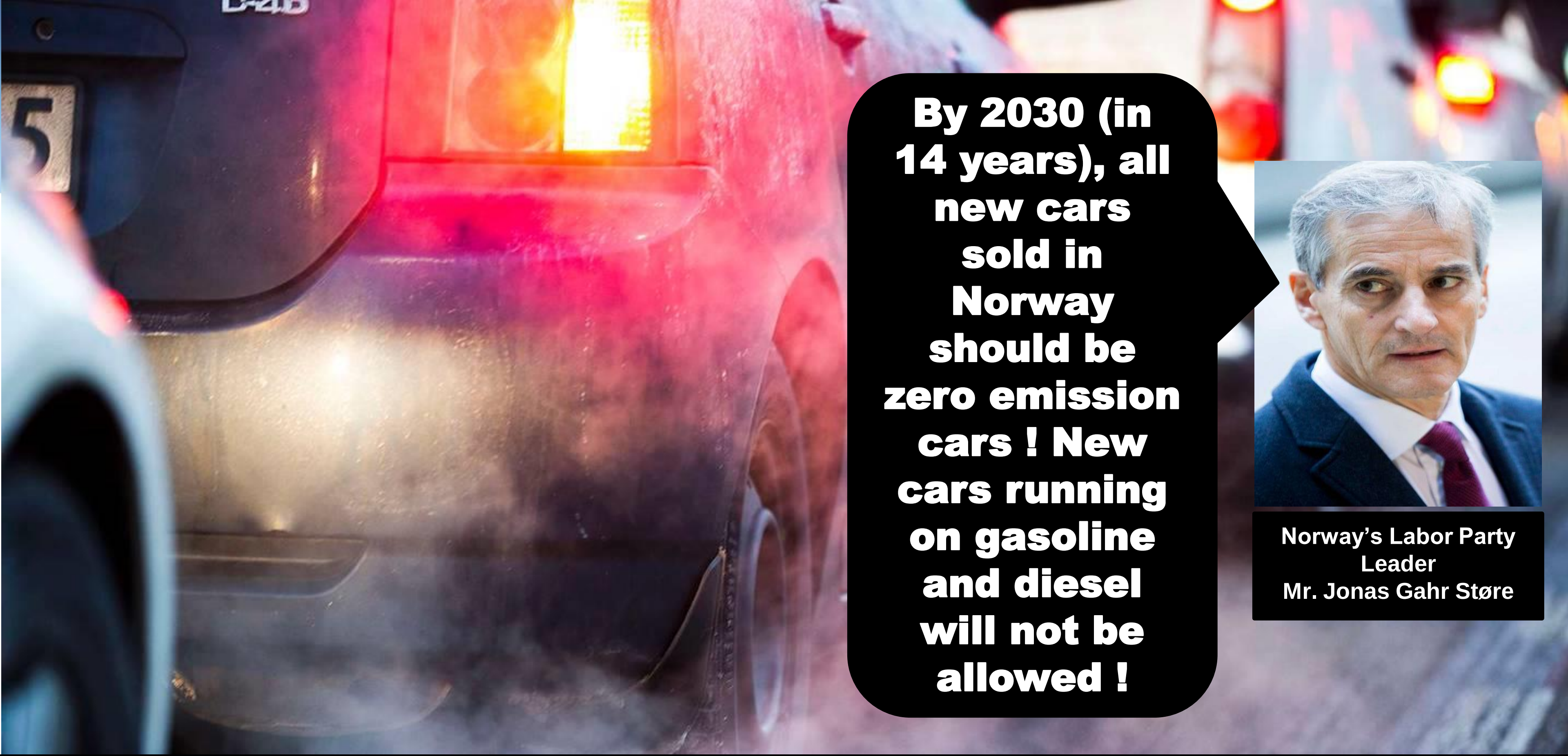
CONSUMERS

Note: 'Desperate Housewives' is a registered Trademark of ABC

VICTOR HUGO

“ Nothing is stronger than an idea whose time has come “


CLIMATE SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• etc. etc.



Norway's Labor Party Leader
Mr. Jonas Gahr Støre

Source: Dagens Naeringsliv, February 3, 2016

E&P2.0 MEANS

NAVIGATE SUCCESS IN

4E

- Efficient E&P operations to produce sufficient oil & gas supply to meet growing global demand
- Economic E&P w/competitive ROI, BE, TSR
- Environmentally sustainable E&P: Maintaining the license to operate and the public's trust
- Education about E&P: The public, attract the brightest STEM students, E&P employees

TRANSITIONS

SWITCH
LEADING A BALANCED NATIONAL ENERGY CONVERSATION
WINNER
BEST OF FEST
COLORADO ENVIRONMENTAL FILM FESTIVAL

SPE International

SOURCE: BP TECHNOLOGY OUTLOOK

- Energy companies' investment portfolios will evolve over time <u>in line with government policies</u>
- Ultimately, <u>national and international policies will determine how much of and which resources</u> (coal, oil, gas, solar, wind, geothermal, biofuel, nuclear, hydro, NIY) will be produced !

122 Years Ago (1894)

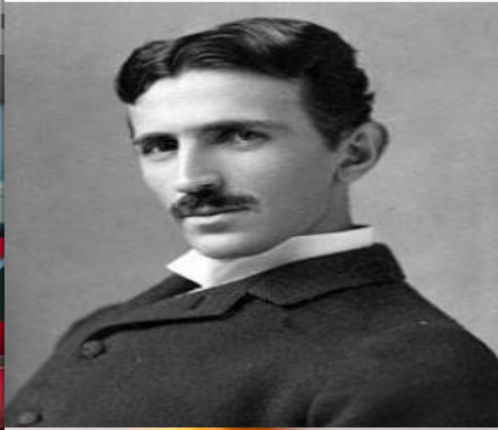
Carl Benz received a US patent for the 1st gasoline-driven car

~1875
NEW YORK

1933
NEW YORK


2016
NEW YORK

Nikola Tesla



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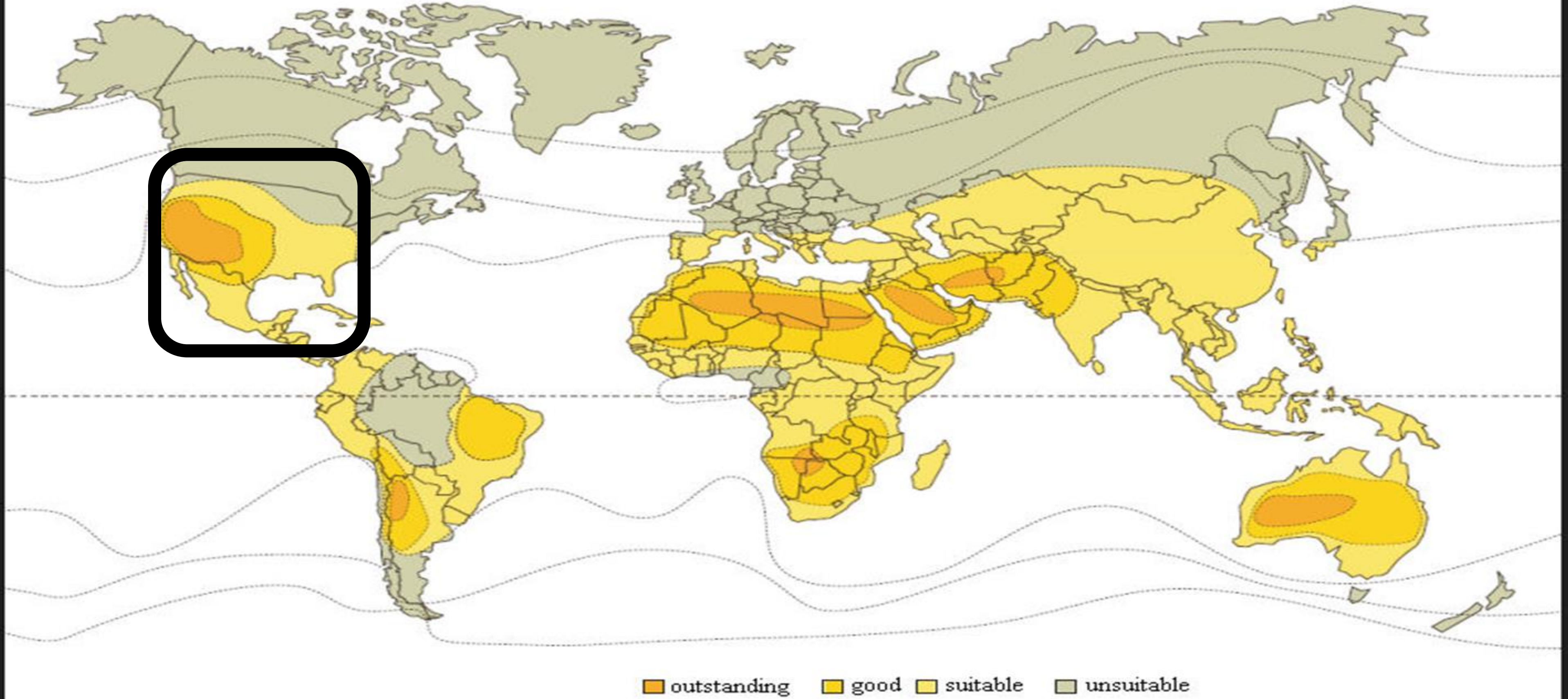
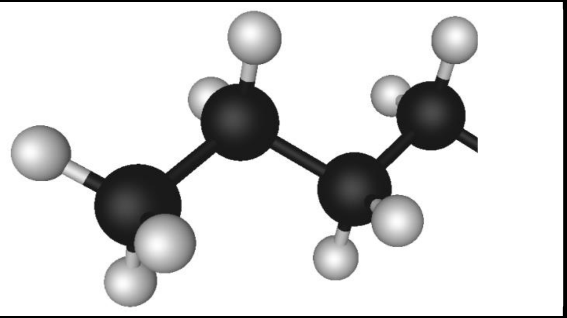
DRIVERLESS CARS“

(Volvo’s IntelliSafe Autopilot)

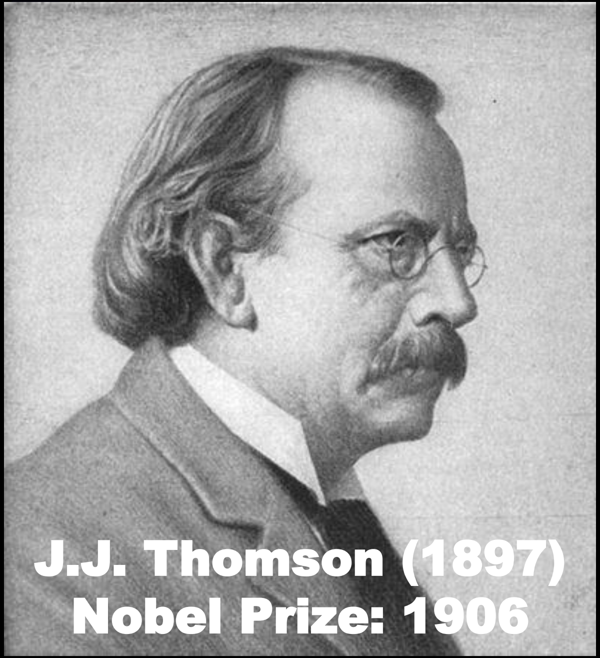
Remote Car Battery Charging Via Electromagnetic Fields

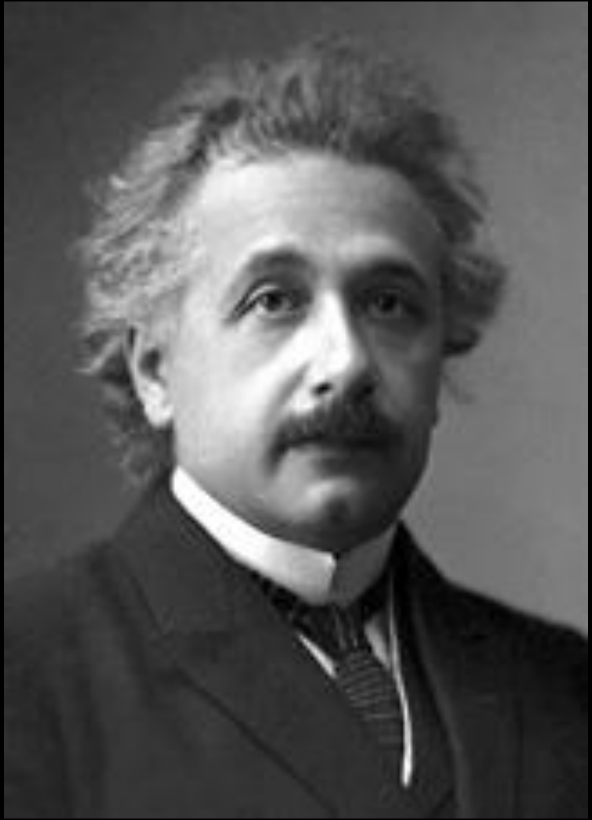

outstanding
good
suitable
unsuitable

HYDROCARBON MOLECULES



ELECTRONS ELECTRICITY





- No-one can predict the forward oil price
- Boom & Bust will continue
- Oil & Gas will be needed for many decades
- The industry must navigate success in 4E
- E&P2.0: An imperative, and everyone in the ‘E&P village’ must contribute – including UT
- Imagination is king; Incremental and radical E&P improvements urgently needed – from UT
- The invisible hand of the market will less and less pick the energy winners; gov. & int. agr. will!
- ‘Dot-collectors’ will experience more serendipity
- The fittest = the most diverse & the best collaborators

Robert Kennedy

THE FUTURE

‘ The future is not a gift: It is an achievement. Every generation helps make its own future ’

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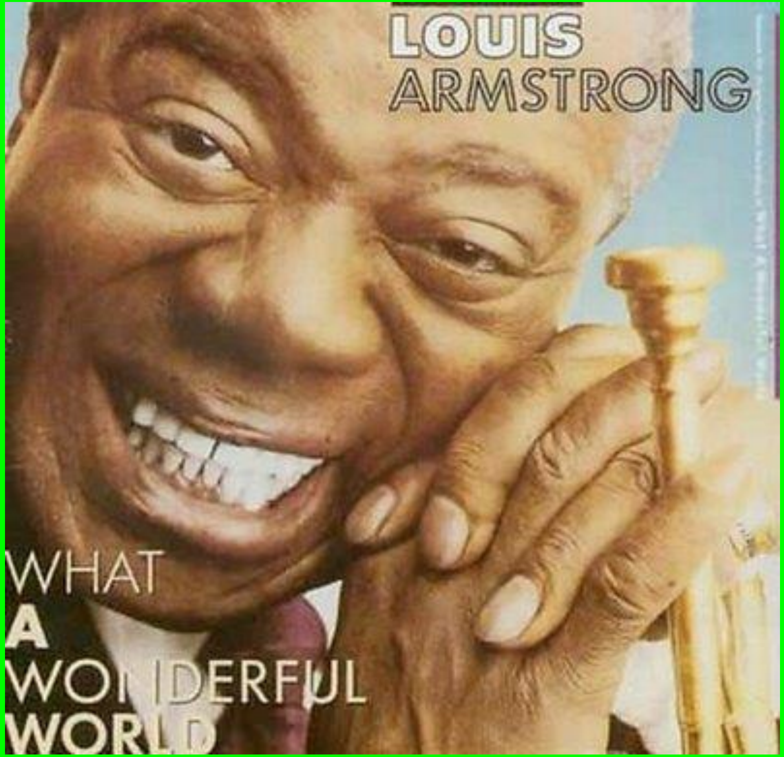

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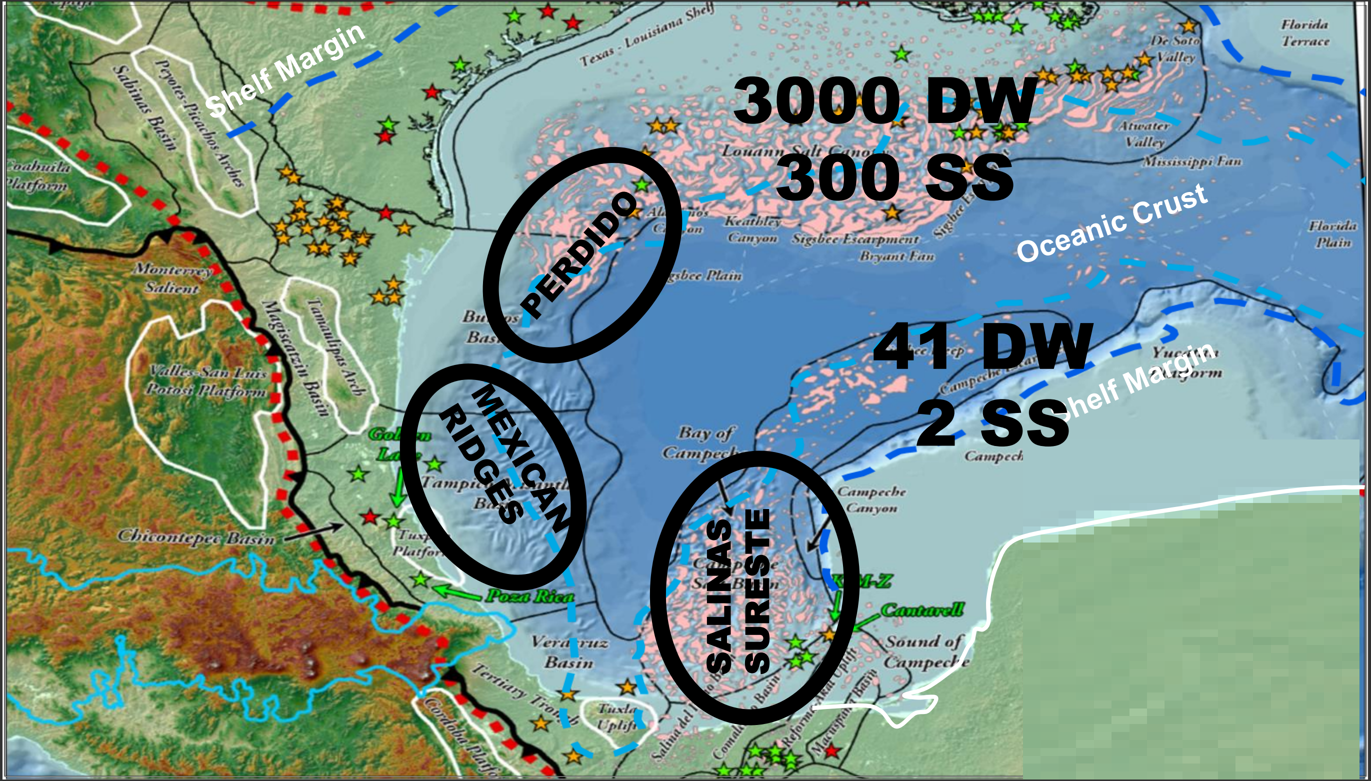
Mexico Deepwater GoM Overview



THE BIG PICTUE: MX DW IS A VERY LONG-TERM BUSINESS

Our Petroleum Engineering Forecasts That Are The Basis For Every Investment Decision - Are Increasingly

Looks Like Systematic ‘Sugar Coating’ Or A Clear Bias Towards The Optimistic

- RESERVES
- PRODUCTION
- COST
- SCHEDULE

Mr. Neeraj Nandurdikar
Director of IPA's Global E&P Business

ABOUT THE LAST 40 E&P MEGAPROJECTS


‘ The person who will finally turn off the lights on the NCS is not yet born ‘