

The Demise of the Global Oil Industry

We are rapidly heading towards a systemic
global oil/financial shock

Tim Clarke

Acknowledgements

This presentation is the summary of 15 years research into the interaction between oil, finance and debt; and a professional lifetime of working towards energy sustainability.

In 2005 I predicted the world would soon experience a global financial shock. (Tralee presentation Sept 2005 “Peak Oil = Peak Money”). Since then events/trends have moved in a thoroughly predictable direction which will I believe soon culminate in a systemic energy/financial crisis.

I acknowledge the work of the world’s pre-eminent independent oil engineers, and systems analysts notably;

- B.W.Hill; Head of Hills Group, USA; whose 2013 and 2015 studies on depletion are *a wakeup call to the world.* (www.hillsgroup.org)
- Dr Louis Arnoux: CEO of nGeni (ITS - Systems Engineering B.V)
- David Korowicz: David Korowicz Human Systems Consulting, Ireland

1.0

Our Industrial Civilisation is Powered by Oil

Our Industrial Civilisation is Powered by Oil

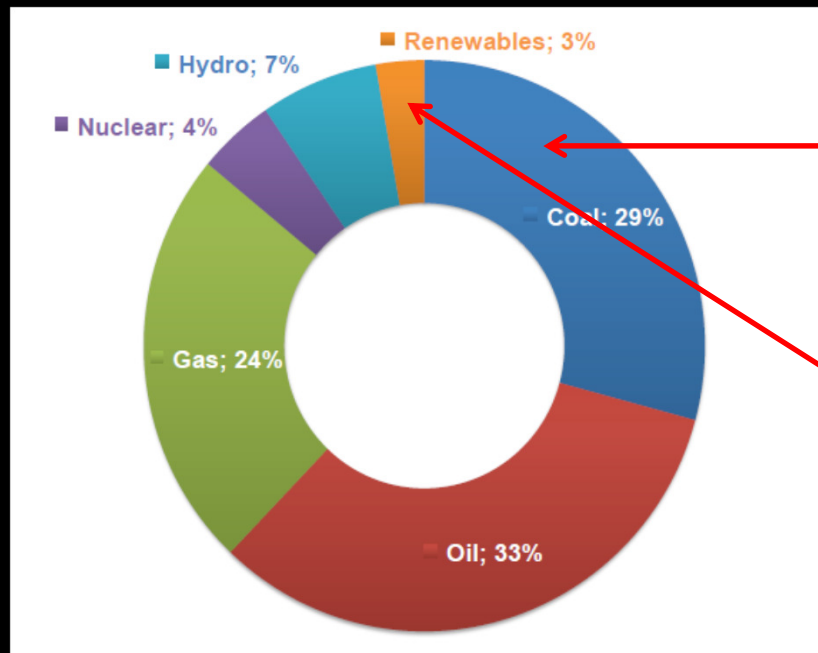
“Only by triggering the imagination can we begin to appreciate the statement: “*we live in a civilization powered by oil*”. If petroleum were to disappear from our lives we would no longer recognize the world in which we live; nor would we have the slightest notion of how to exist in it.

For the continuance of modern society, petroleum is an essential commodity”.

*BW Hill 2013
Depletion: The Fate of the Oil Age*

Our Industrial Civilisation is Powered by Oil

It takes oil energy to produce ALL other sources of energy: coal, natural gas (drilling, equipment, pipelines), and ALL renewable energy equipment (solar panels, wind turbines, and biomass energy)



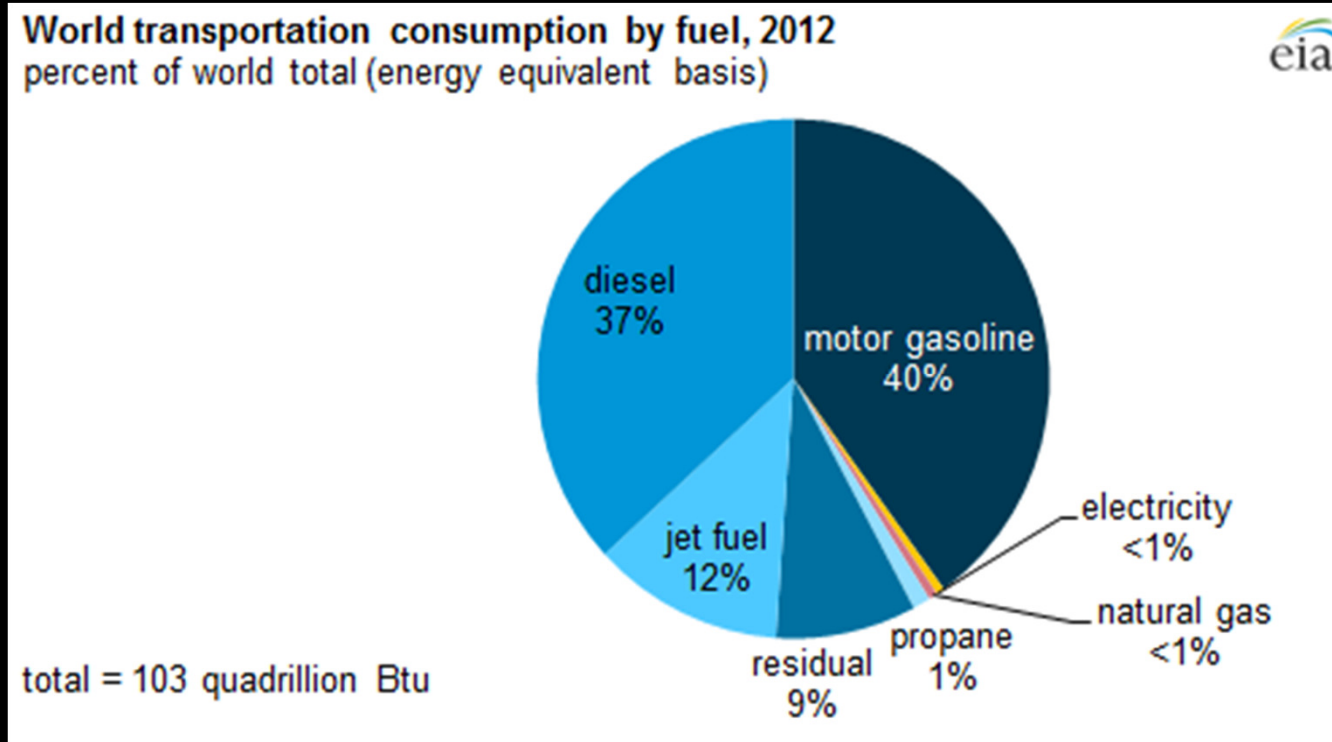
For instance, coal production and distribution is 100% dependent on oil.

Renewables (solar, wind, biomass etc) comprise only 3% of global energy production (excluding Hydro and Nuclear which require huge amounts of oil to implement)

BP Global Energy Outlook 2016

“Oil stands at the root of the entire, complex, globalised set of energy networks. Coal mining, transport, processing, and use depend substantially on oil-derived transport fuels; ditto for gas and nuclear plants” Dr Louis Arnoux.

Our Industrial Civilisation is Powered by Oil



World Transport is fuelled by OIL

Global Transport Fuels in 2016 comprise ~97% Oil Derived Products

Our Industrial Civilisation is Powered by Oil



Industrial agriculture and food production are heavily dependent on oil.

For every calorie of food on the plate, it requires over 10 calories of energy to grow, fertilise, harvest, process, package, refrigerate, and deliver food to the shop

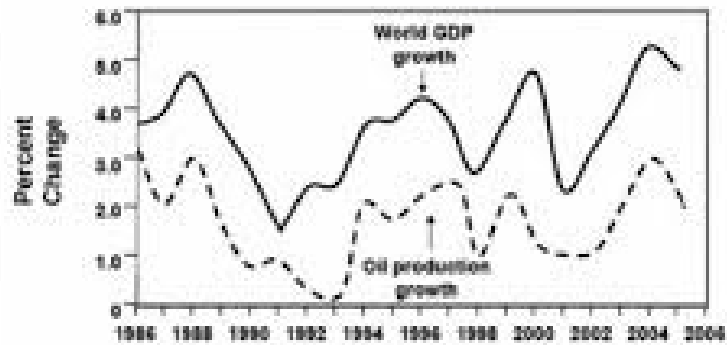


“We are three meals away from anarchy”

Our Industrial Civilisation is Powered by Oil

OIL, GDP, ENERGY are INTERDEPENDENT

World GDP Growth & World Oil Production Growth Have Tracked For Decades.



World Growth in GDP, Energy, and Oil



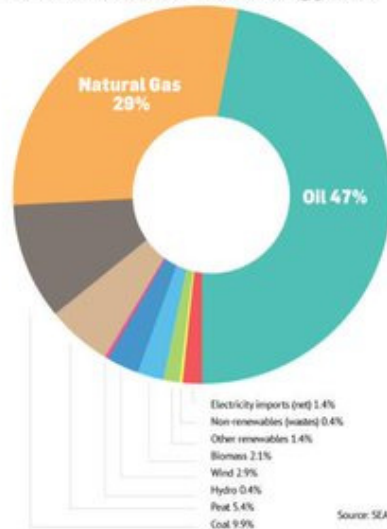
Energy and GDP are Dependent on OIL

~

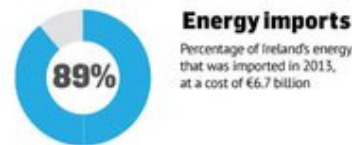
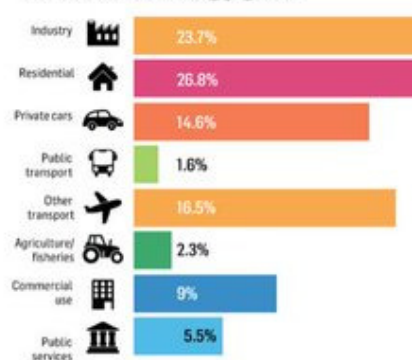
The Economic System is Dependent on OIL

Our Industrial Civilisation is Powered by Oil

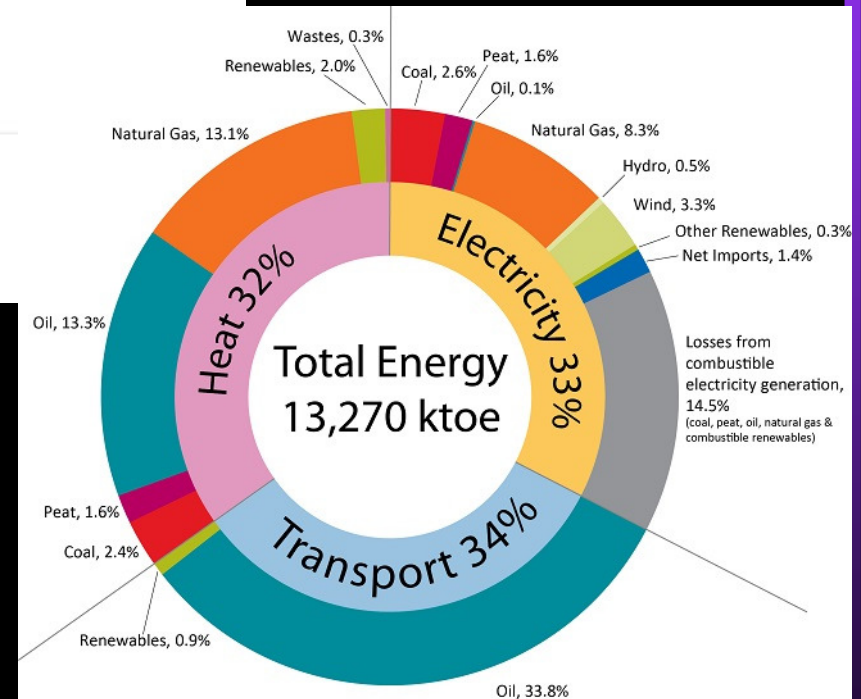
Ireland's sources of energy 2013



Where our energy goes



Ireland is TOTALLY DEPENDENT ON OIL, not only for its own economy (47% of all energy!) – but what is not shown in these graphs - for import/export of materials, food and goods, travel and tourism



Our Industrial Civilisation is Powered by Oil

***PEOPLE BELIEVE THAT WE HAVE A CHOICE
OF ENERGY SOURCES***

FOOD CONSUMER GOODS SERVICES , ETC



ELECTRICITY HEAT FERTILISERS TRANSPORT COMMODITIES INFRASTRUCTURE

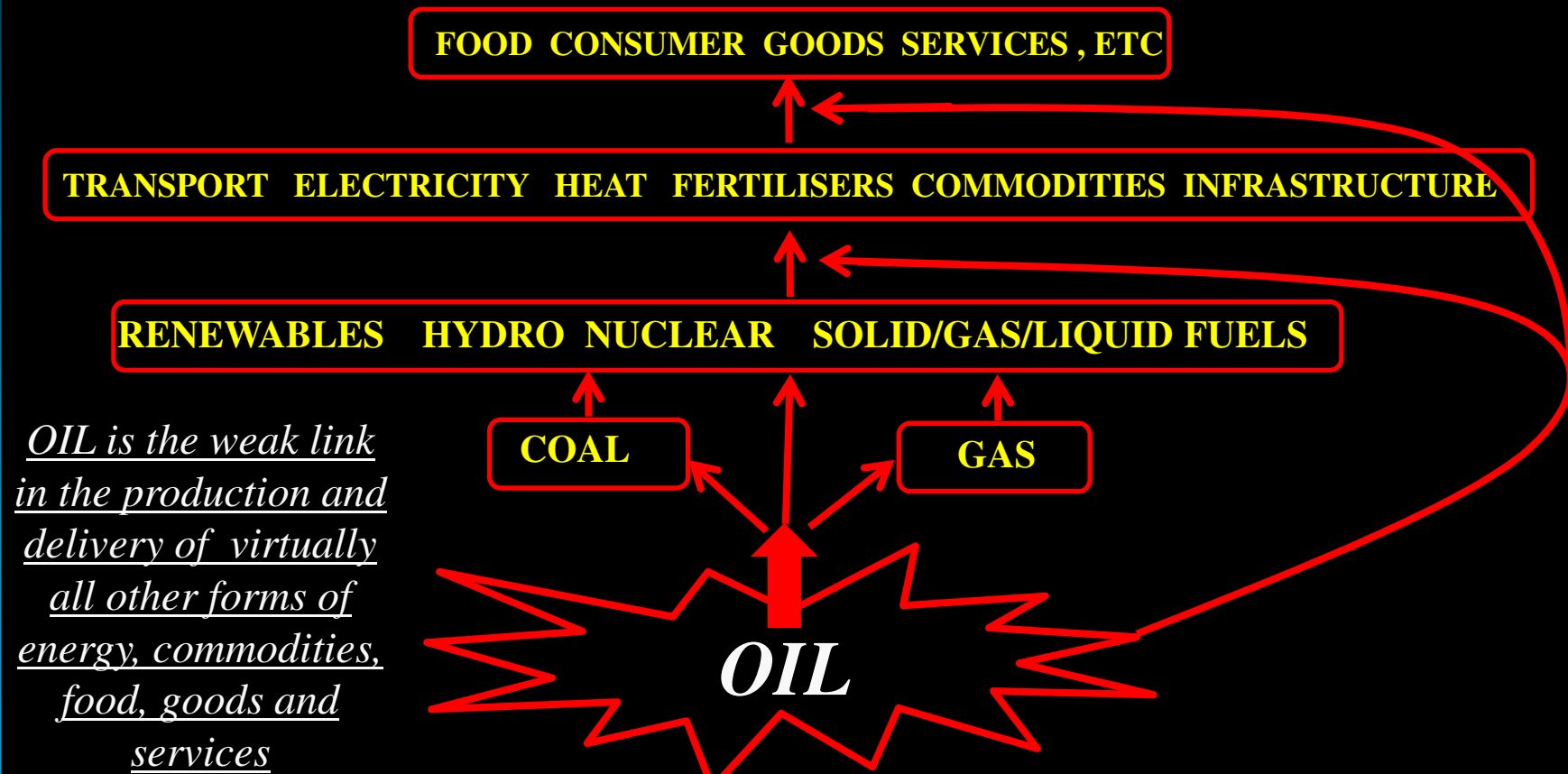


OIL RENEWABLES COAL GAS NUCLEAR HYDRO

WRONG

Our Industrial Civilisation is Powered by Oil

THE REALITY IS



Our Industrial Civilisation is Powered by Oil

SUMMARY

Global transport, infrastructure, extraction and production of minerals and commodities (including all other energy sources; coal, renewables, nuclear, LPG, N-Gas), and the industrial food system are all utterly dependent on oil.

Oil is required somewhere in the production and delivery chain of virtually all industrial processes

It Is The Weakest Link

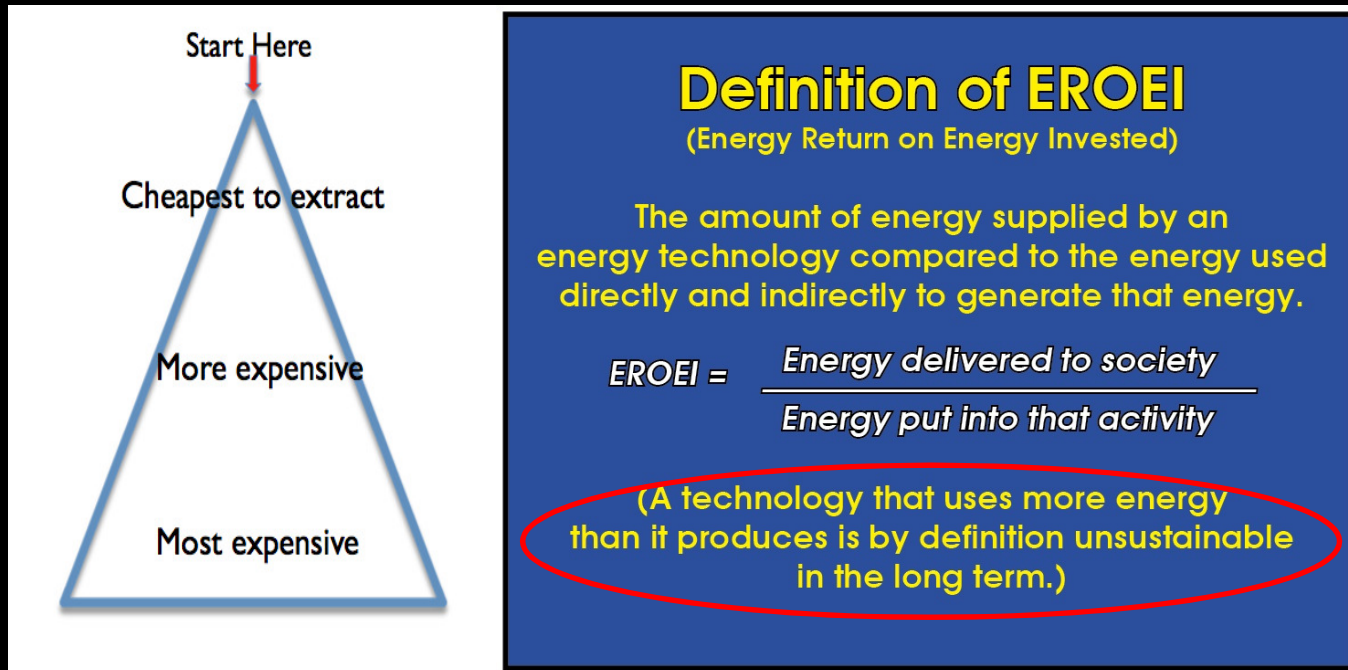
OUR GLOBAL INDUSTRIAL WORLD ECONOMY
IS
TOTALLY DEPENDENT ON OIL

2.0

Problems with Oil

EROEI (EROI)= Energy Return on Energy Invested

Problems with Oil - EROEI



“Each year the world's petroleum industry lifts, forces, and pumps four and one-half billion tons of water, and crude oil from almost a mile below the surface.

Each year the water portion grows larger, and the oil less.

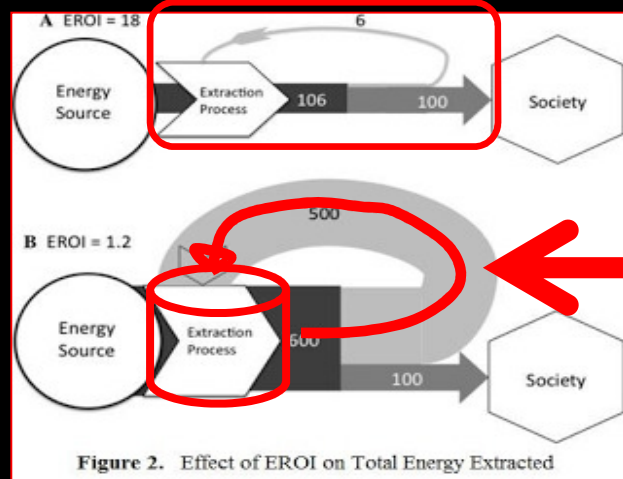
The depletion of petroleum is continuing - and it is on a relentless march toward its completion!” B.W.Hill

Problems with Oil - EROEI

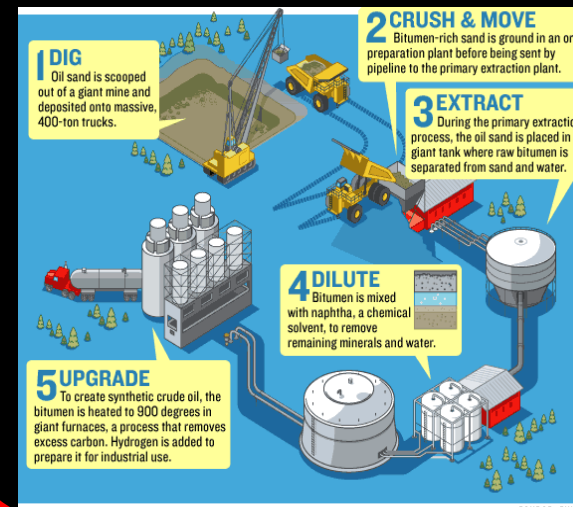
Remaining reserves and new sources of oil require much more energy to produce



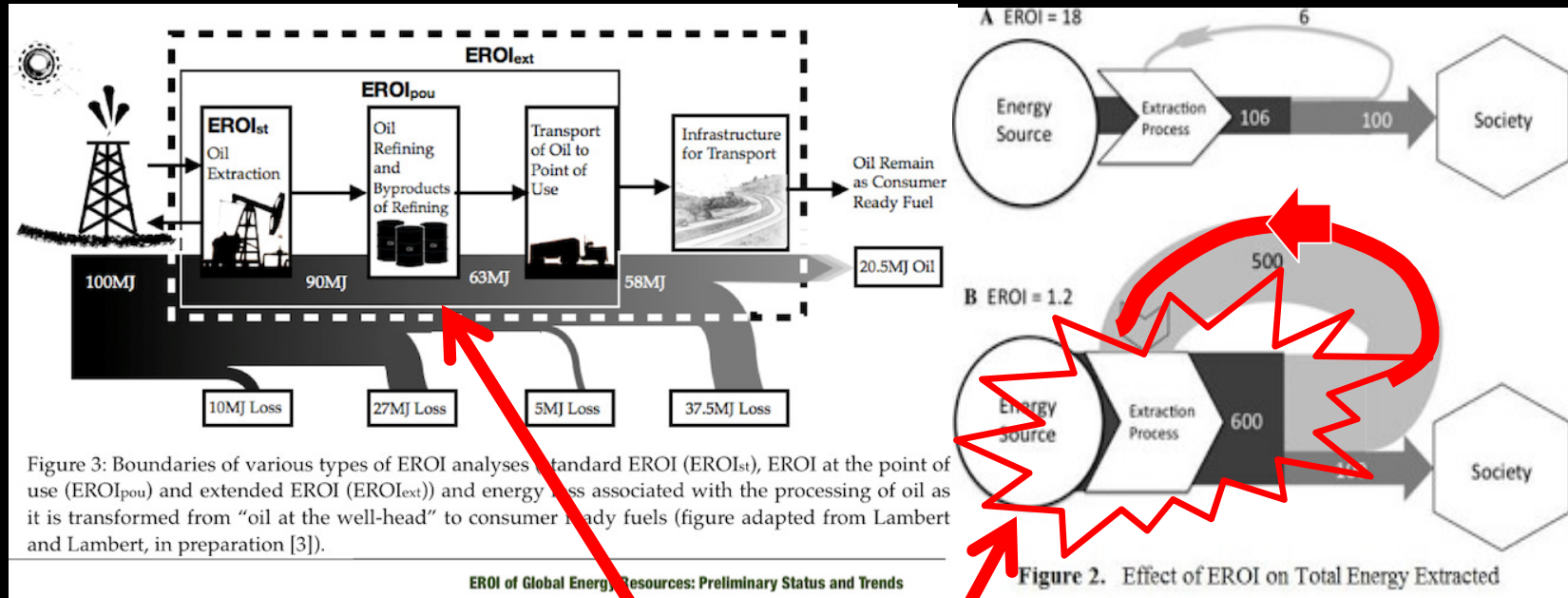
1910



2016



Problems with Oil - EROEI



The easy oil has been used up. Existing reserves of conventional crude oil and new unconventional oil sources are much less pure (increasing water content, bituminous, high sulphur, heavy oil) and more difficult to extract (deep water, tar sands, fracking, polar).

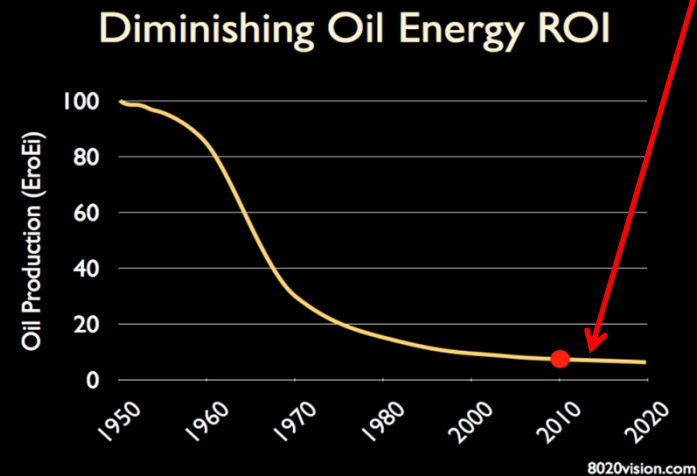
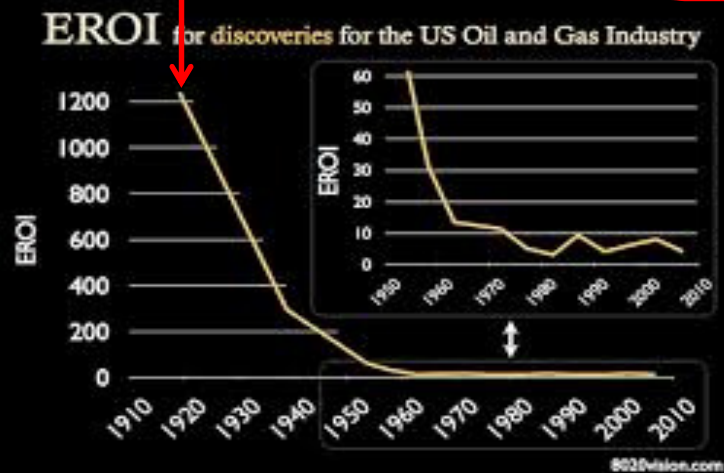
Oil now requires increasing amounts of energy to extract, separate, and refine into useable energy products

Problems with Oil - EROEI

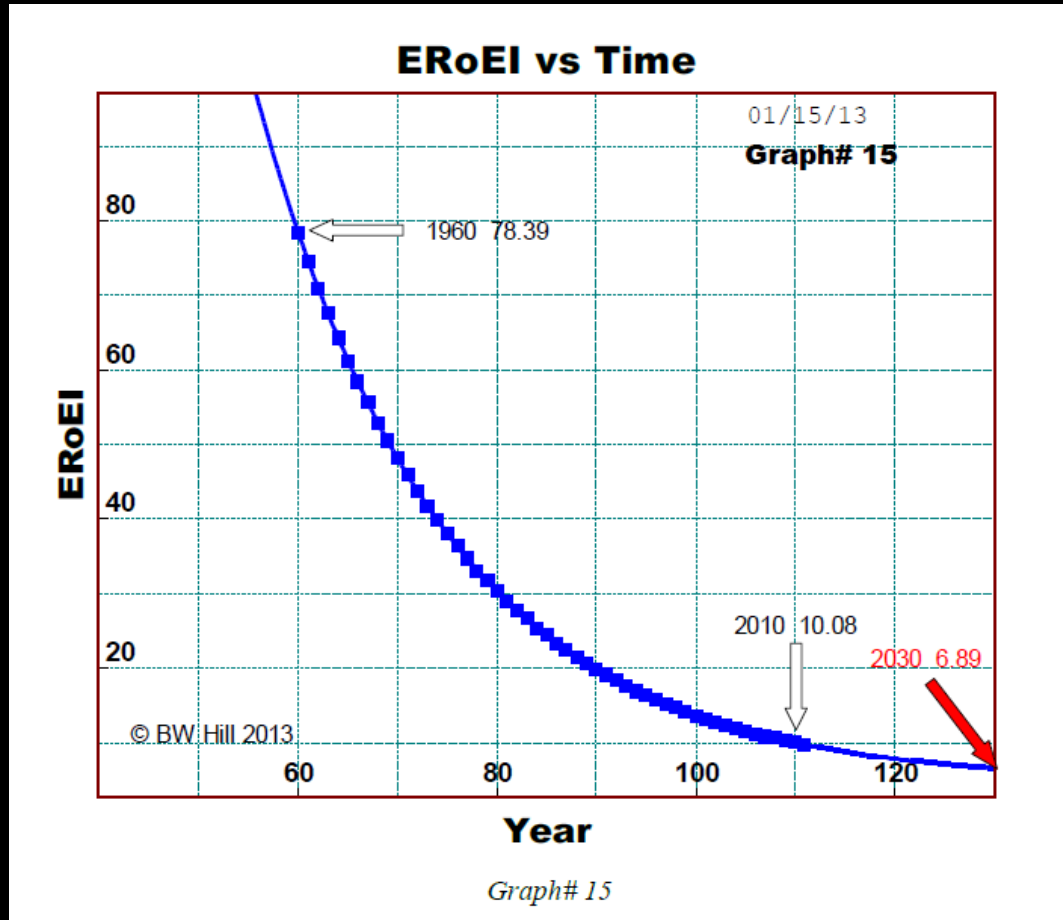
Remaining reserves and new sources of oil require much more energy to produce



1910 -
2016



Problems with Oil - EROEI



BW Hill (2015)

Depletion - A Determination of the Worlds Petroleum Reserve

Problems with Oil - EROEI

“EROI of Global Energy Resources:
Status, Trends and Social Implications.”

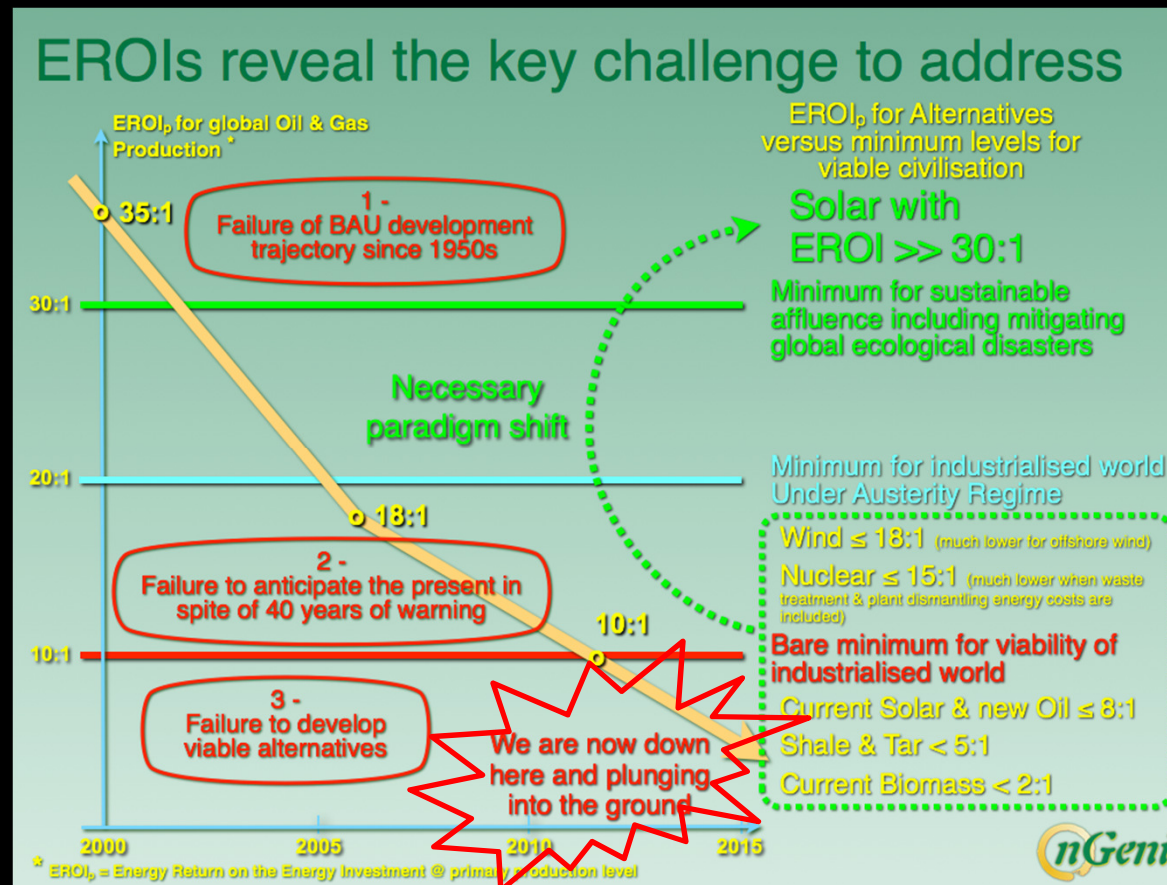
UK Department for International Development (DFID)

“The decline in EROI has meant that an increasing amount of the energy we extract is having to be diverted back into getting new energy out, leaving less for other social investments.”

The DFID report warns: “The declining EROI of traditional fossil fuel energy sources and its eventual effect on the world economy are likely to result in a myriad of unforeseen consequences.”

Problems with Oil - EROEI

2016; Rapidly depleting global net oil available to the economy after deducting oil used in extraction, refining and production



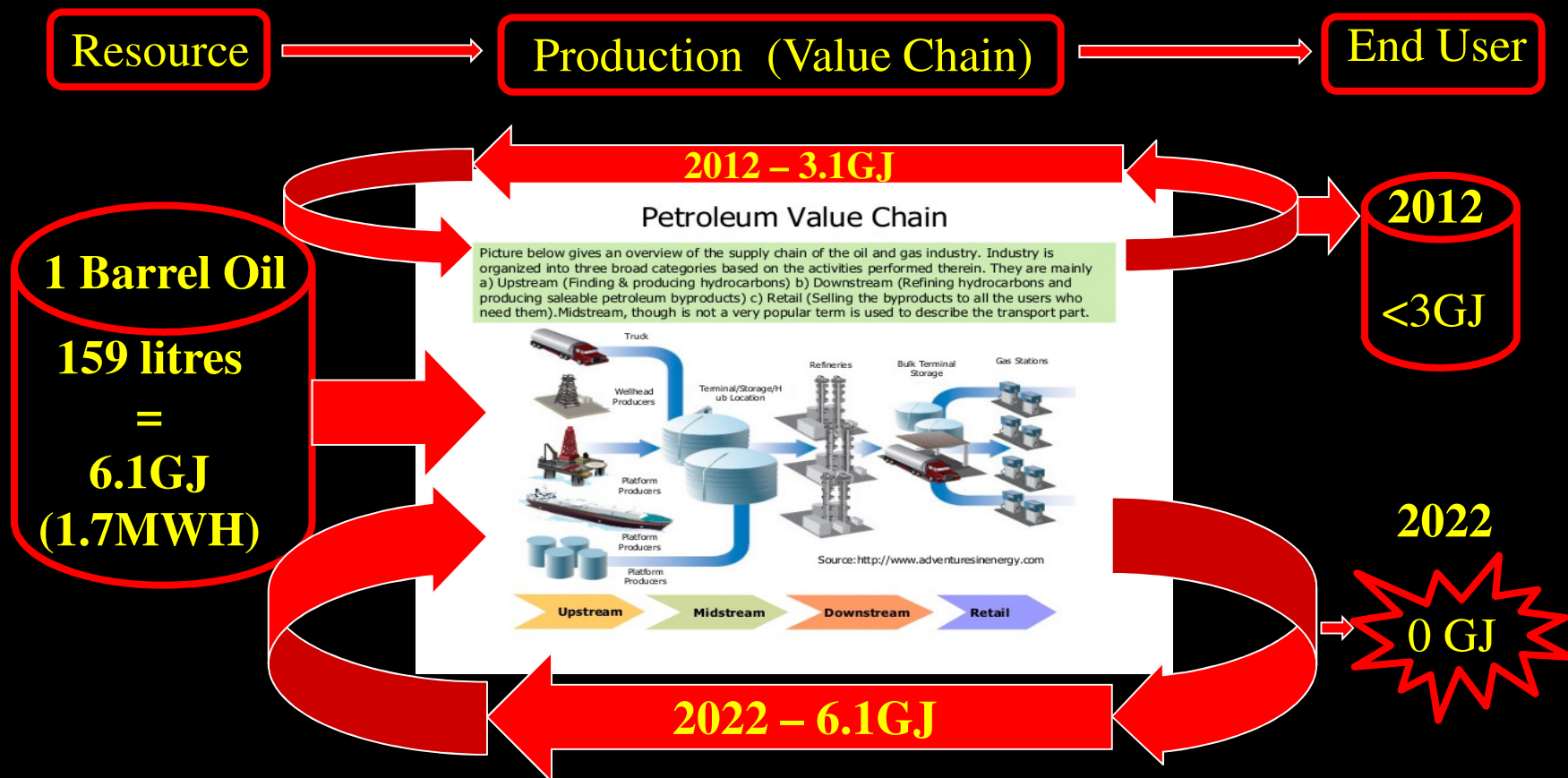
Problems with Oil - EROEI

*“The 2012 energy half-way point initiated a major change in the petroleum production function. It began a process where the end consumer was no longer able to acquire all the petroleum that the industry produced. **More of the energy from petroleum was being committed to the production of petroleum than was being delivered to the consumer. This precipitated the 2014 price decline that reduced prices by 50%. The energy delivered to the end consumer will continue to decline, and the end consumer maximum affordability will decline with it**” BW Hill 2015*

*“In 2012 the Global Oil Industry on average began to use more energy per barrel in its own processes (from oil exploration to transport fuel deliveries at the petrol stations) than what it delivers NET to the Global Economy. **We are now down below 4GJ/head and dropping fast**” (Dr Louis Arnoux 2016)*

If the cost of making a product exceeds the price at which it can be sold – the producer needs a new business model. If it will soon take more energy to deliver our primary fuel to the end user than the fuel contains – **we need a new energy model - fast!**

Problems with Oil - EROEI



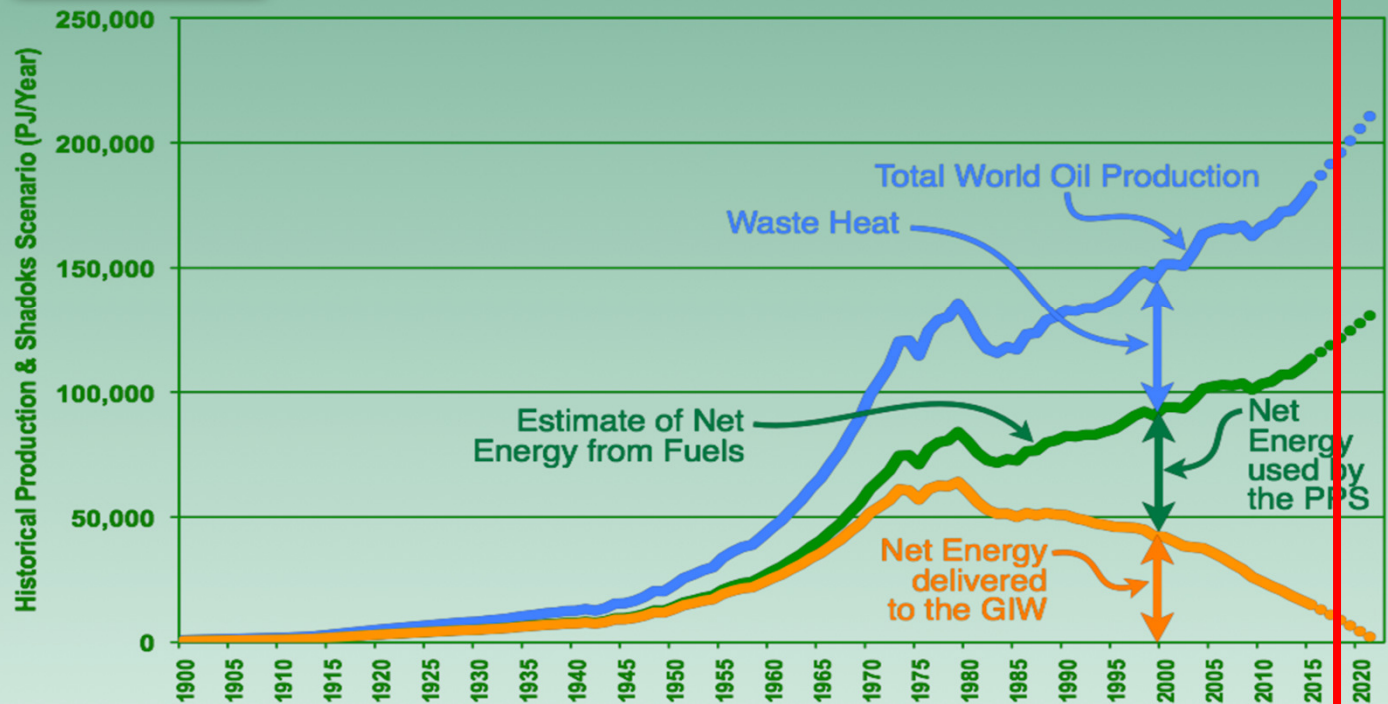
In 2012 the Global Oil Industry on average began to use more energy per barrel in its own processes (from oil exploration to transport fuel deliveries at the petrol stations) than what it delivers NET to the Global Economy (Dr Louis Arnoux 2016).

Net Oil Energy available to the economy after 2022 will have declined to ZERO

Problems with Oil - EROEI



The Oil Age... as we knew it

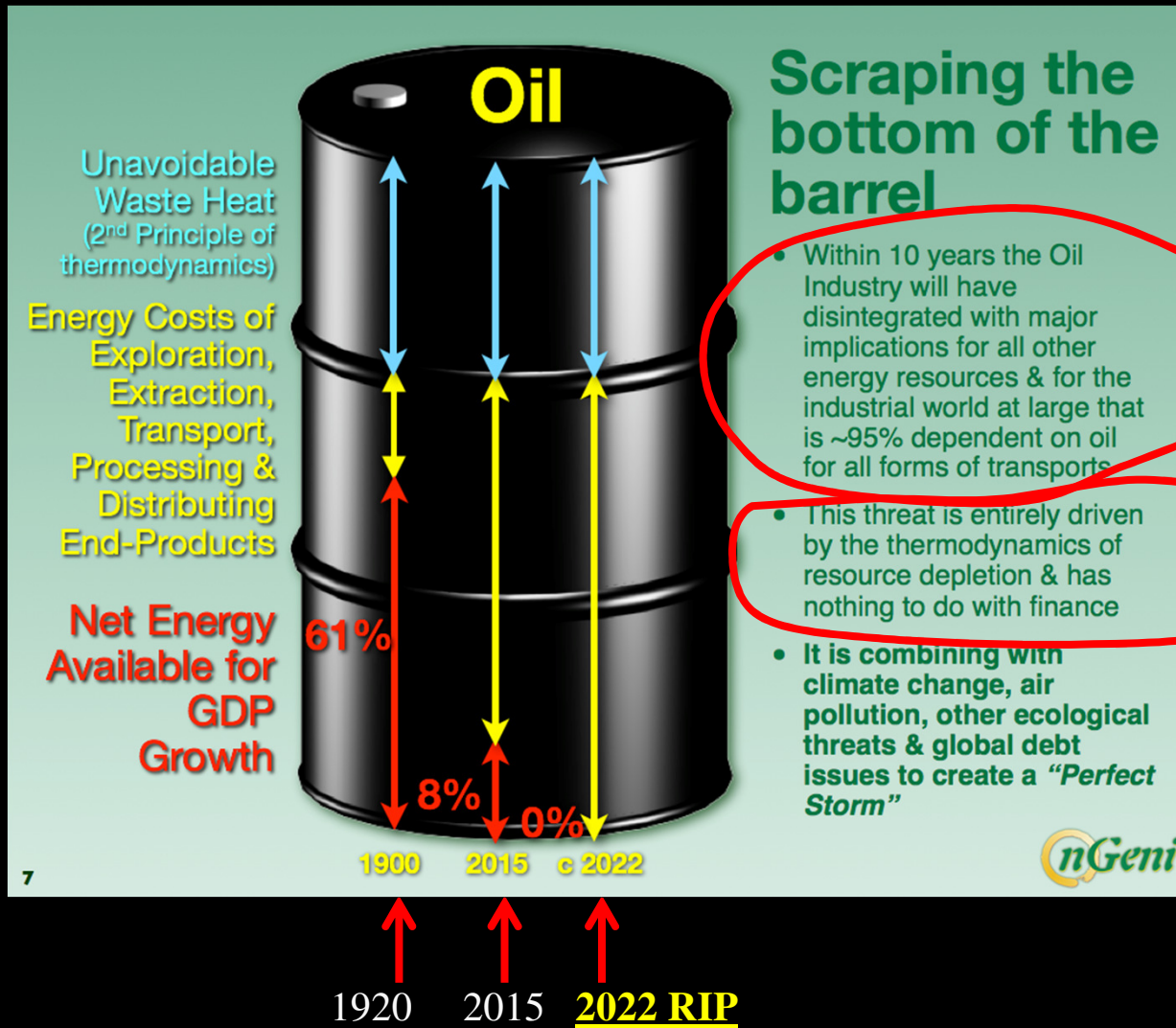


Unless alternative primary energy sources are brought in rapidly enough the Oil Age as we know it will have fizzled out by circa 2022

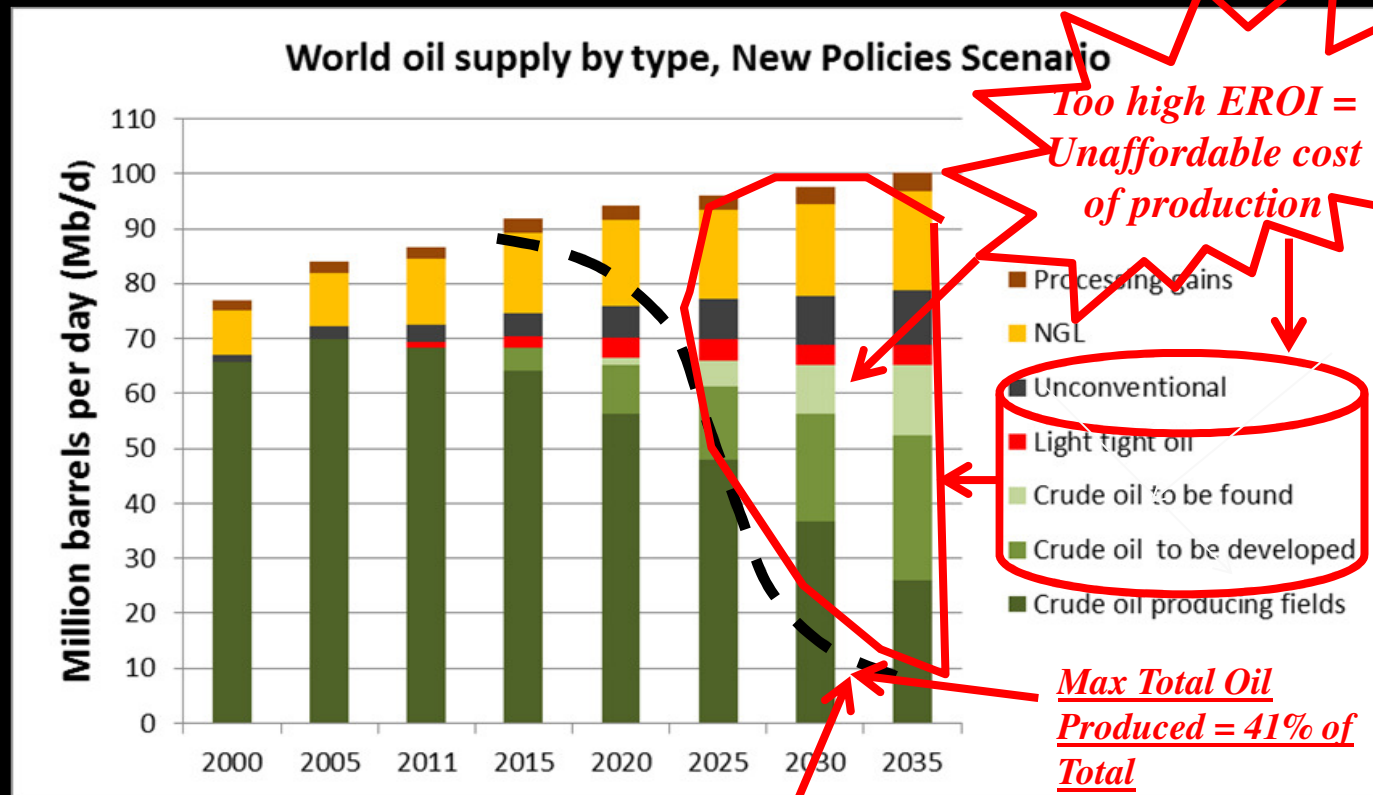


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Problems with Oil - EROEI



Problems with Oil - EROEI



“Optimistic estimates place the world's total petroleum reserve at 4,300 billion barrels. Of that quantity the ETP model predicts that it will be possible to extract (ONLY) 1,760 billion barrels. This constitutes (only) 40.9% of the total reserve. This is in agreement with assessments that have been made by several noted petro-geologists”. *The Hills Group 2013*

Problems with Oil - EROEI

“For purely thermodynamic reasons, **NET energy** delivered to the globalised industrial world per barrel by the oil industry is rapidly trending to zero. By NET energy we mean here what the oil industry delivers to the world economy essentially in the form of transport fuels, after the energy used for exploration, production, transport, refining and end products delivery have been deducted.

However, things break down well before reaching “ground zero”; i.e. by 2022 the oil industry as we know it will have disintegrated.

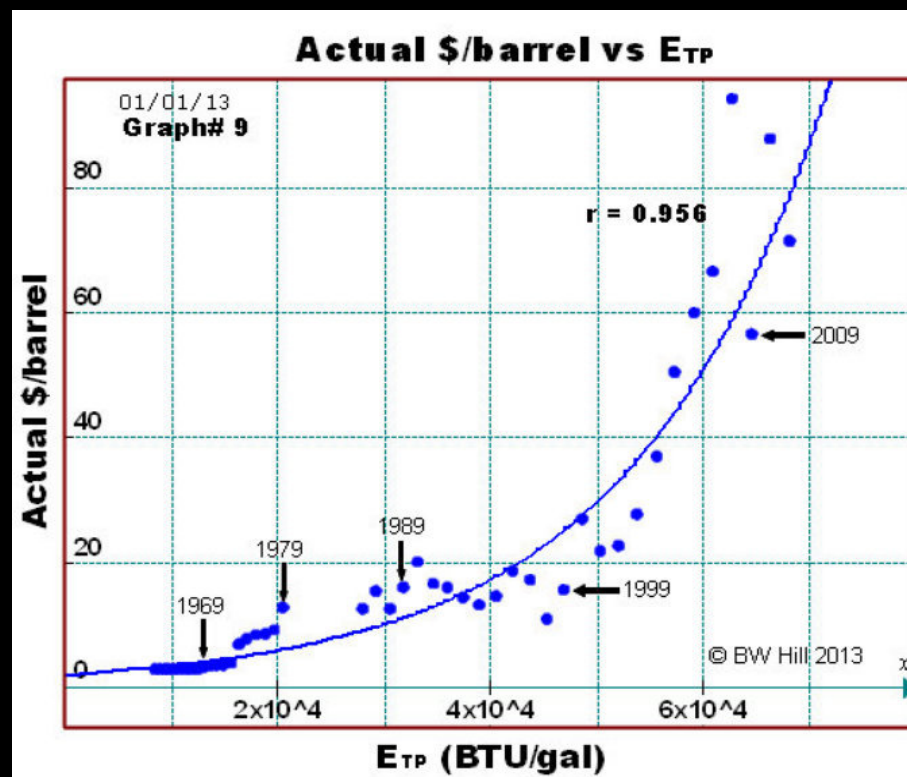
Actually, a number of analysts from entities like Deloitte or Chatham House, reading financial tealeaves, are progressively reaching the same kind of conclusions.” Dr Louis Arnoux - August 2016

Declining EROEI is reflected in the increasing cost of production

3.0

Problems with Oil
Declining EROEI = Increasing Cost of Production

Problems with Oil – Increasing Cost of Production



“To extract petroleum, and to produce its products requires energy. As the extraction process progresses the energy required per unit increases. While the energy to produce petroleum is increasing, the energy being delivered to the consumer per unit is declining. BW.Hill

Problems with Oil – Increasing Cost of Production

Diminishing Oil Energy ROI

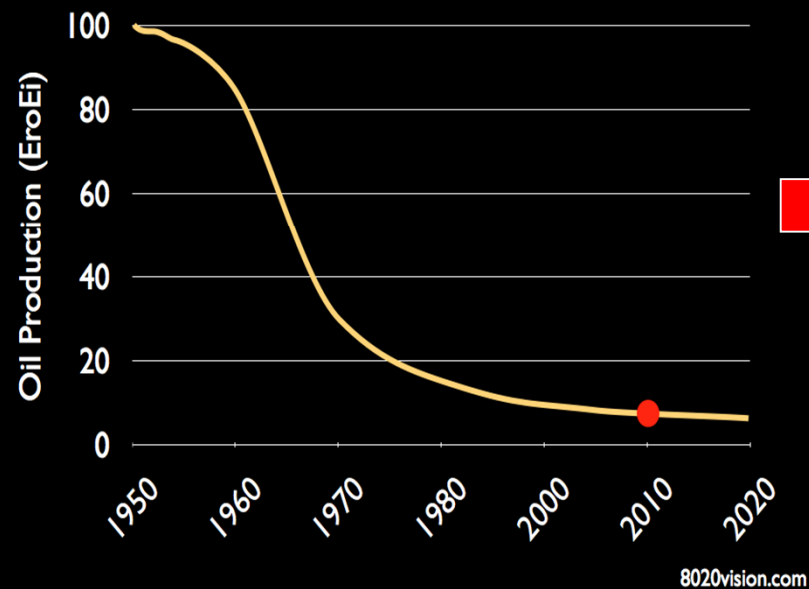
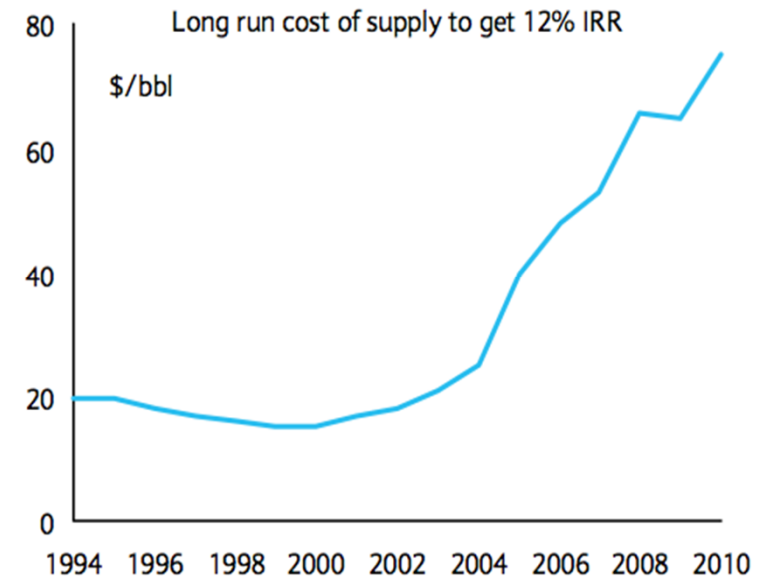


Figure 26: The cost of production, especially outside OPEC, has soared

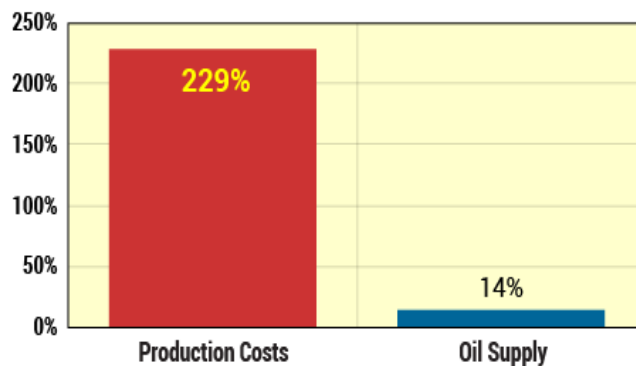


Note: IRR=Internal rate of return. Source: Barclays Capital Equity Research

Diminishing NET energy ~> Increasing production cost

Problems with Oil – Increasing Cost of Production

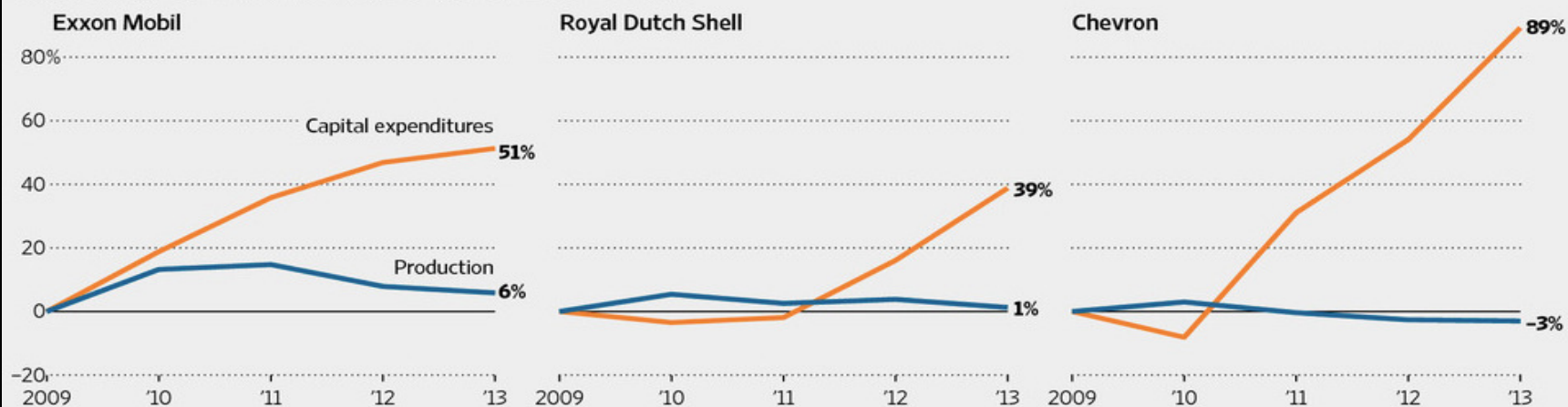
Production Costs Increase vs. Oil Supply (2000–2010)



Oil production costs of top 50 oil companies

Costly Quest

Exxon, Shell and Chevron have been spending at record levels as they seek to boost their oil and gas output. It has yet to pay off. Below, change in production and capital expenditures since 2009.

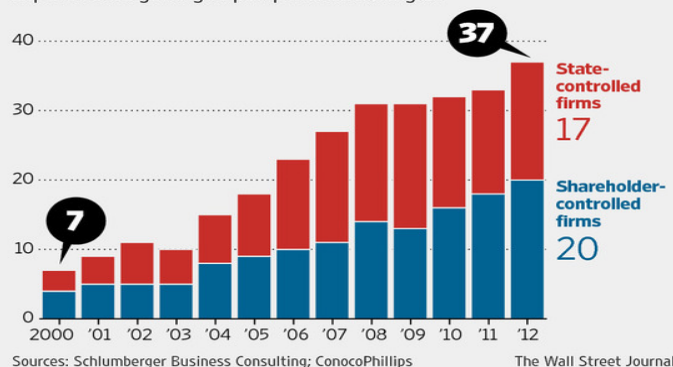


Note: Spending in 2013 reflects company estimates; for Shell it is net of asset sales; production rate in 2013 is through the first nine months. Source: the companies The Wall Street Journal

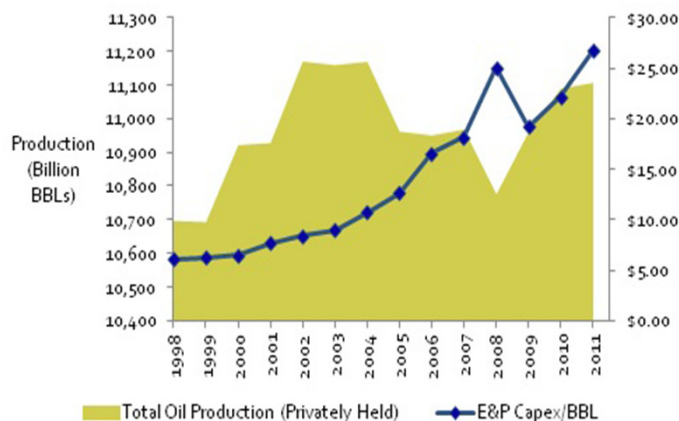
Problems with Oil – Increasing Cost of Production

Big Oil, Big Costs

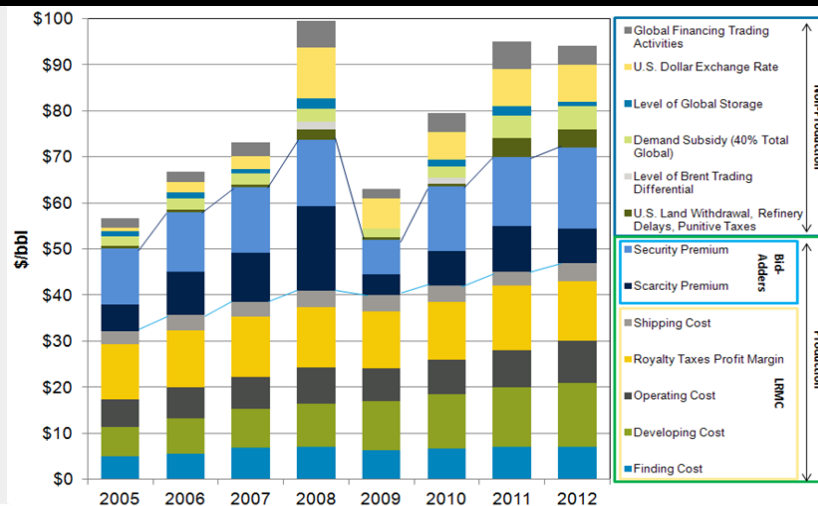
The number of companies taking on mega projects that cost \$5 billion or more to build has ballooned, highlighting how expensive it's getting to pump more oil and gas.



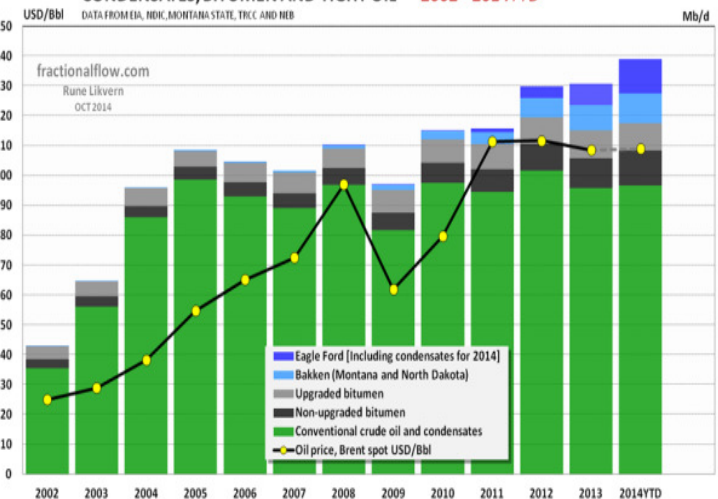
Cost to replace each barrel of oil produced is up 350%



Source: Lux Research, Inc.
www.luxresearchinc.com



DEVELOPMENT IN SUPPLIES OF CONVENTIONAL CRUDE OIL AND CONDENSATES, BITUMEN AND TIGHT OIL 2002 - 2014YTD



4.0

Problems with Oil – The Low Price of Oil

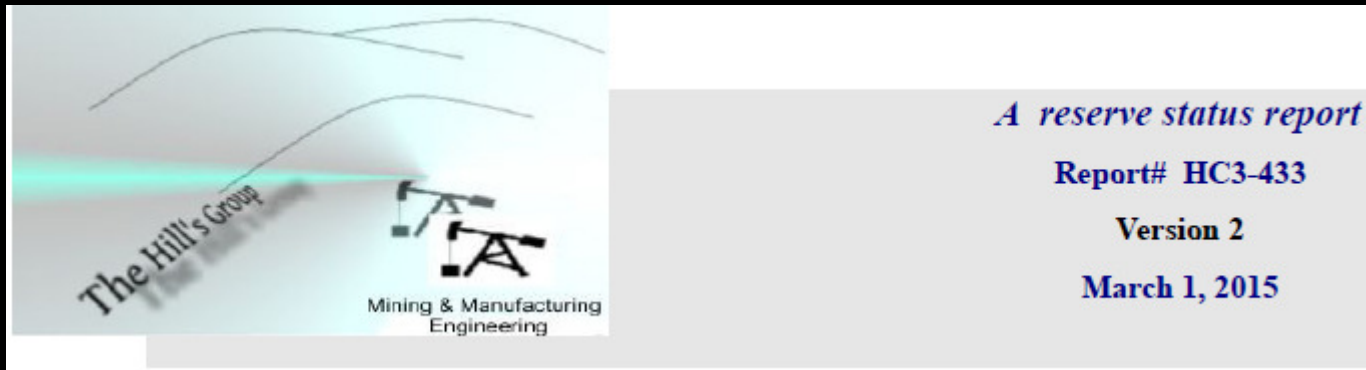
“Depletion is the inevitable consequence of resource extraction. As petroleum depletes, it reaches a point where its ability to power the economy begins to decline; but as the economy declines, its ability to afford to produce petroleum, and its products declines” *BW Hill*.

Problems with Oil – The Low Price of Oil

This section is based on the ground-breaking report of The Hills Group

Depletion: A determination for the world's petroleum reserve

An exergy analysis employing the E_{TP} model

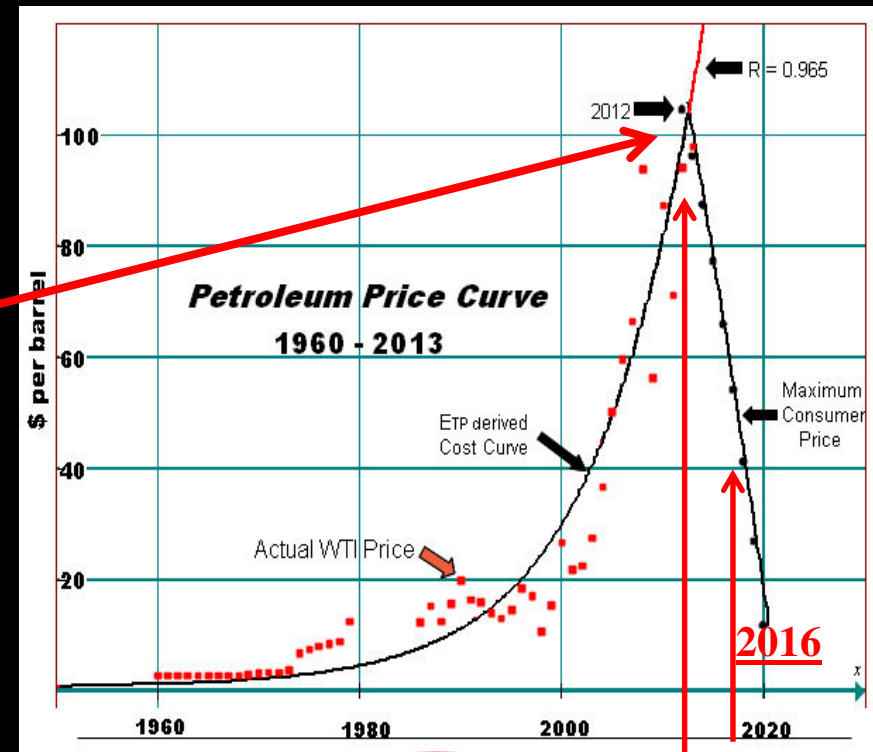


This work (and associated 2013 document) is I believe one of the most important of this century, forewarning the world of the imminent thermodynamic and economic collapse of the global oil industry

Problems with Oil – The Low Price of Oil

*“The **ETP derived Cost Curve** is constructed from the **ETP model**, and has mapped the price of petroleum since 1960 with a correlation coefficient of 0.965 (>96%). It is the most accurate pricing model that has ever been developed”*

“The 2012 energy half-way point initiated a major change in the petroleum production function. More of the energy from petroleum was being committed to the production of petroleum than was being delivered to the consumer. This precipitated the 2014 price decline that reduced prices by 50%. The energy delivered to the end consumer will continue to decline, and the end consumer maximum affordability will decline with it”



“Depletion. The Fate of the Oil Age”

<http://www.thehillsgroup.org>

This report issued in 2013 accurately predicted the imminent fall in oil price and its current average price (~\$50/bbl).

Problems with Oil – The Low Price of Oil

“The Maximum Consumer Price curve is curtailed at 2020 at \$11.76/ barrel.

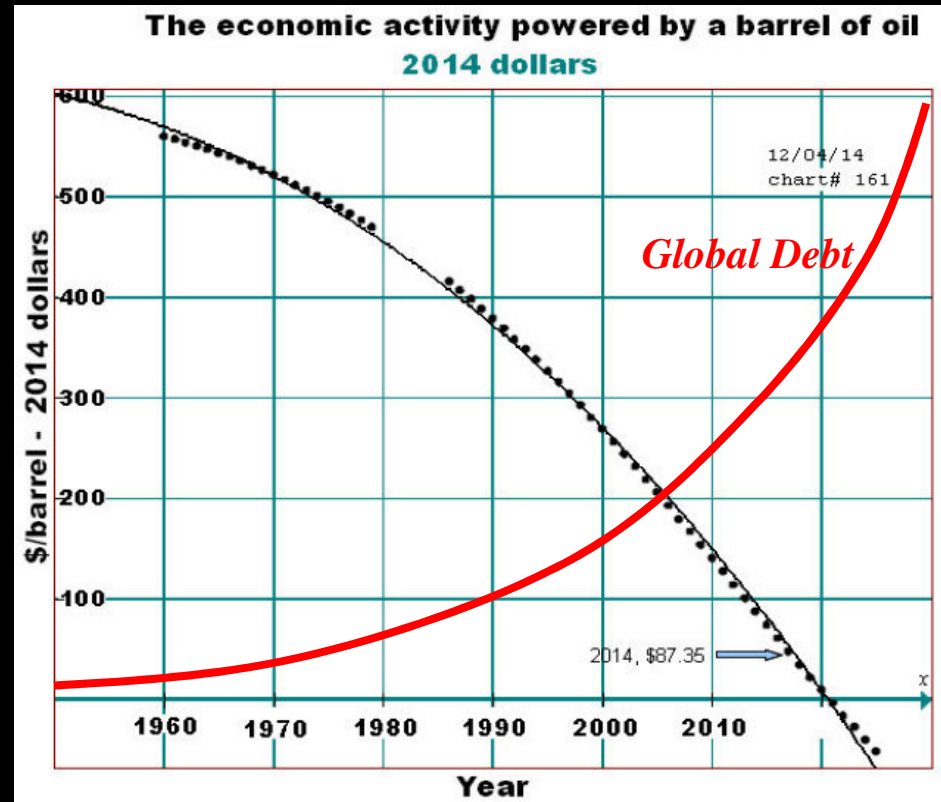
At this point petroleum will no longer be acting as a significant energy source for the economy.

All production from that point forward will be from legacy fields only.

The economic impact that will result from the energy lost to the general economy is beyond the scope of this report.”

The Hills Group

“Depletion: The fate of the oil age”

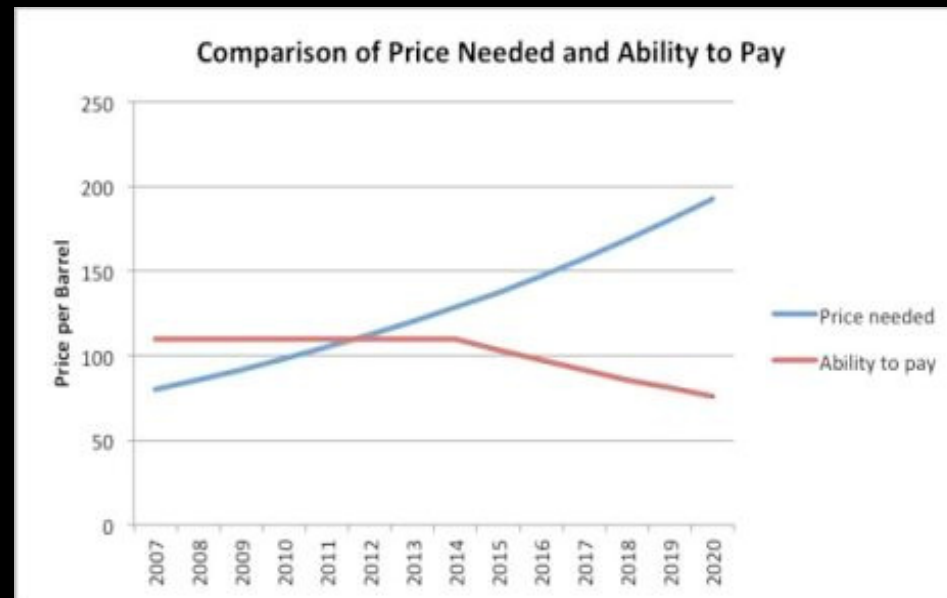


IT IS IMPOSSIBLE TO FULLY COMPREHEND THE GRAVITY OF THESE STATEMENTS.

THE END OF THE OIL AGE IS HAPPENING FAST - NOW

5.0

Problems with Oil *The Oil Industry is Going Bankrupt*



Problems with Oil – The Oil Industry is Going Bankrupt

By [Ambrose Evans-Pritchard](#). Telegraph.

11 Aug 2014 (oil then at \$100/barrel)

“The world’s leading oil and gas companies are taking on debt and selling assets on an unprecedented scale to cover a shortfall in cash, calling into question the long-term viability of large parts of the industry. Not a single large project has come on stream at a break-even cost below \$80 a barrel for almost three years”.

← 2014

“The world is now spending \$2.3 trillion per year more to produce oil than what is received when it is sold” BW Hill

Oil and gas: Debt fears flare up Ed Crooks: F-Times 21-03-2016

The \$3tn debt mountain following the sector’s borrowing binge threatens further destabilisation

Growing bankruptcy crisis in global oil and gas industry

By Gabriel Black 12 May 2016

Lower oil prices have bankrupted dozens of major oil and gas companies since 2015. A total of 69 major oil and gas companies, with \$34.3 billion in debts, have gone bankrupt since 2015

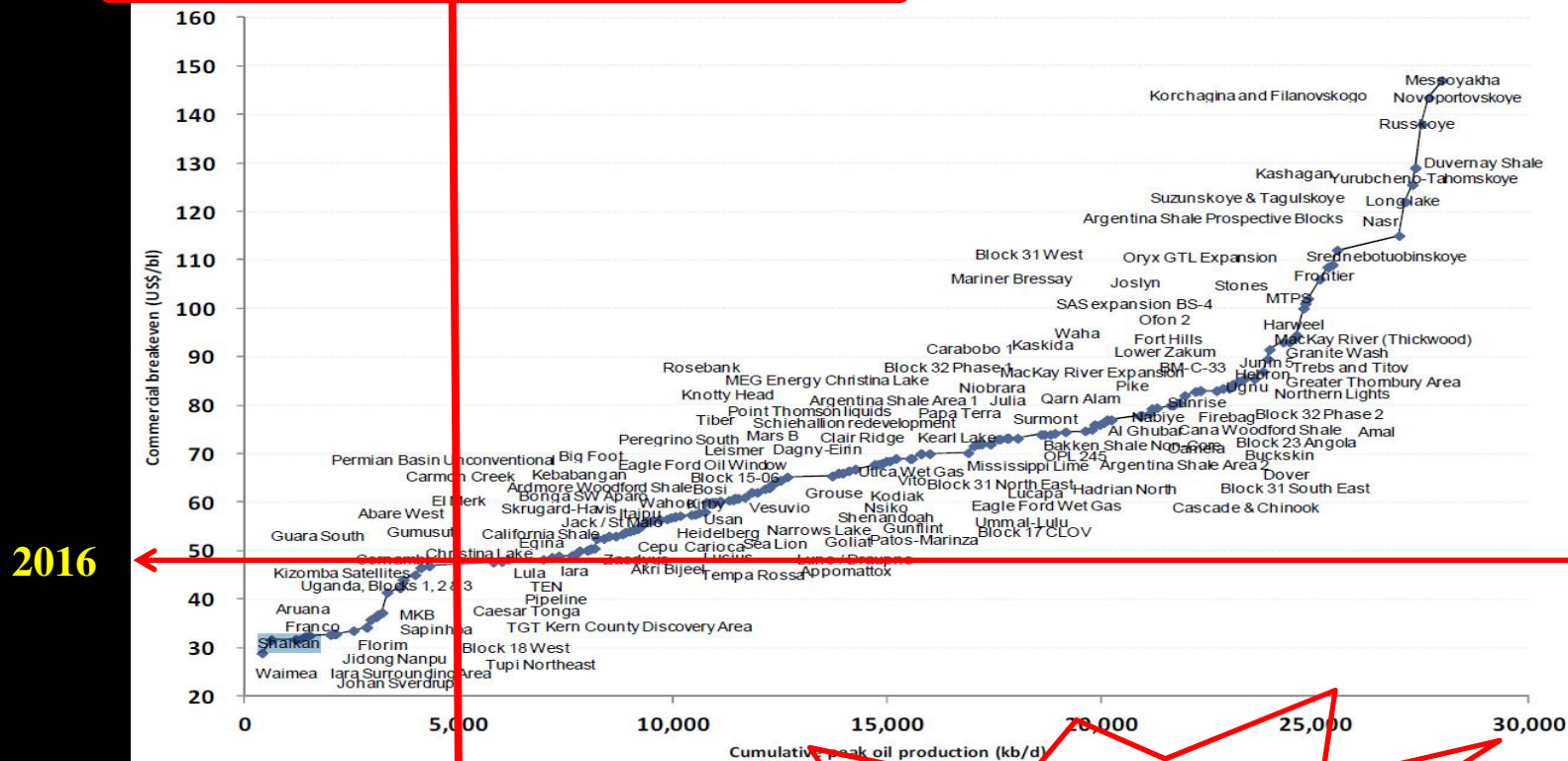
← 2016

The \$3 Trillion Oil And Gas Debt Bomb

Similarities With The Mortgage Bust [Bloomberg Business](#) • April 4, 2016

Problems with Oil – The Oil Industry is Going Bankrupt

Commercial breakeven for the Top 360 oil projects

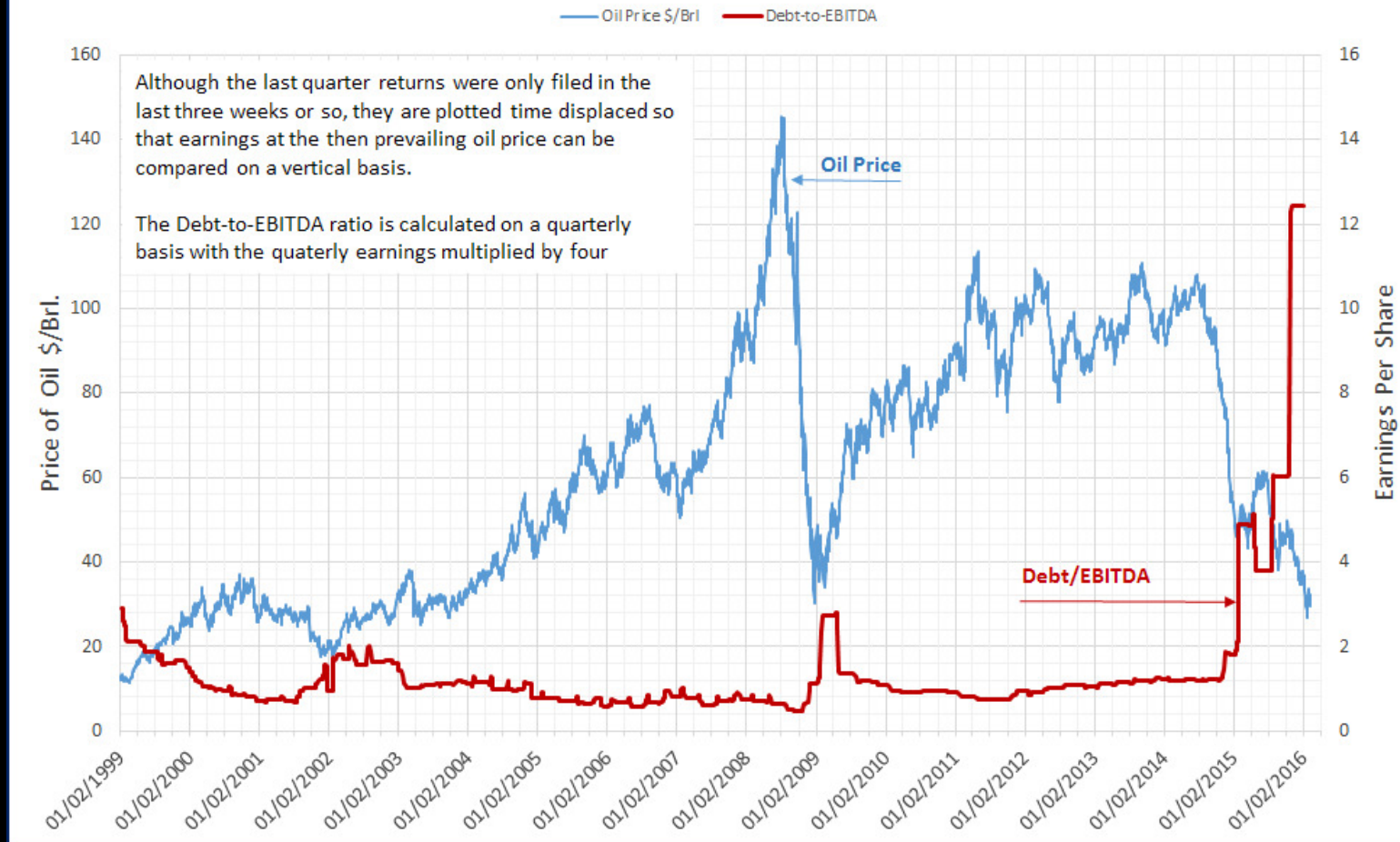


Problems with Oil – The Oil Industry is Going Bankrupt

imarketsignals.com

Figure 2: Energy Sector Debt-to-EBITDA Ratio

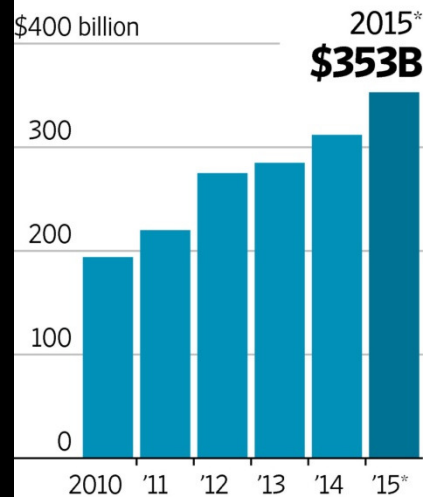
Update to 2/12/2016



Problems with Oil – The Oil Industry is Going Bankrupt

Mounting Debt

Long-term debt for oil exploration and production companies in the U.S. and Canada



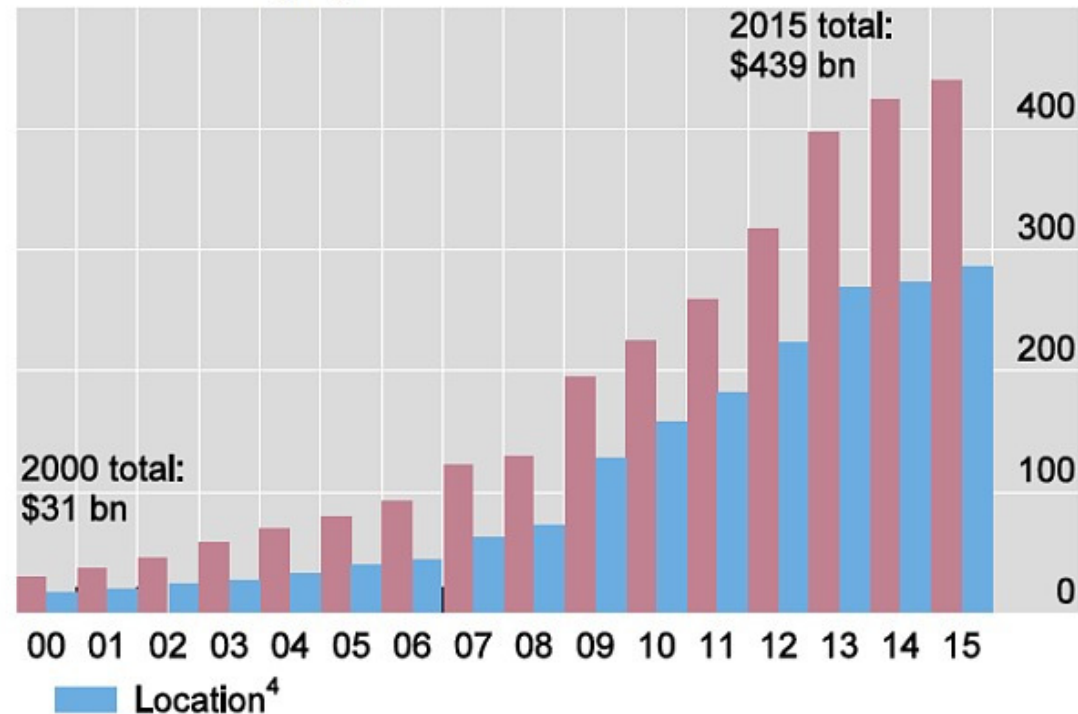
*Through Dec. 17

Note: Based on 134 public companies

Source: AlixPartners

THE WALL STREET JOURNAL.

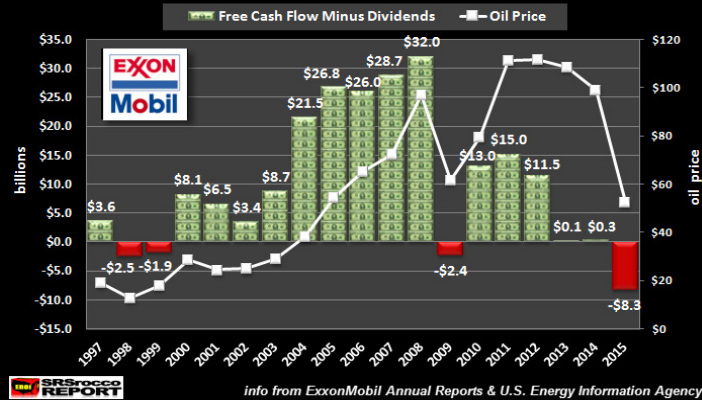
Debt securities issued by oil and gas sector firms in selected emerging economies²



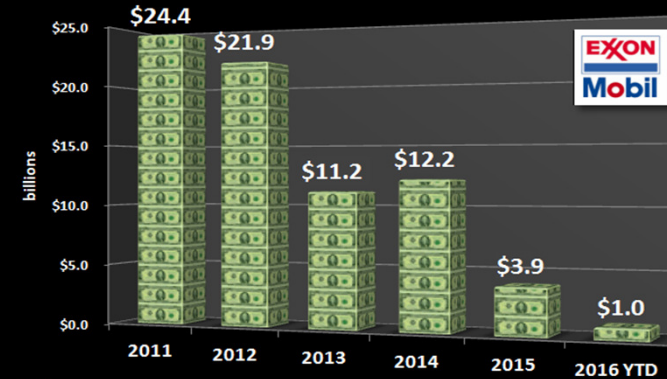
“The Big Oil Show is increasingly fuelled by DEBT (at zero interest rates!). It is cutting exploration, curtailing new projects, cutting costs in many ways but the day of reckoning nears”

Problems with Oil – The Oil Industry is Going Bankrupt

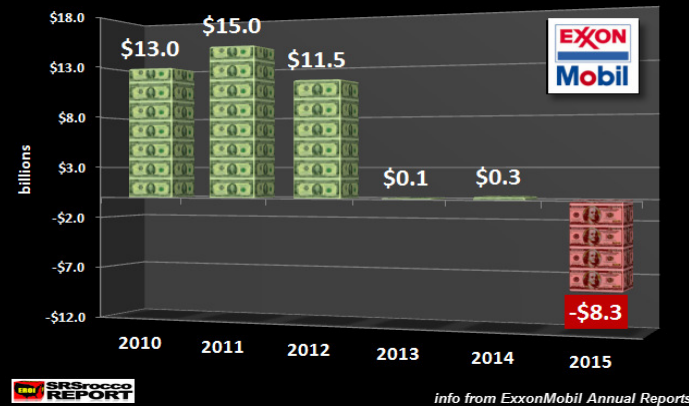
ExxonMobil Free Cash Flow vs The Oil Price



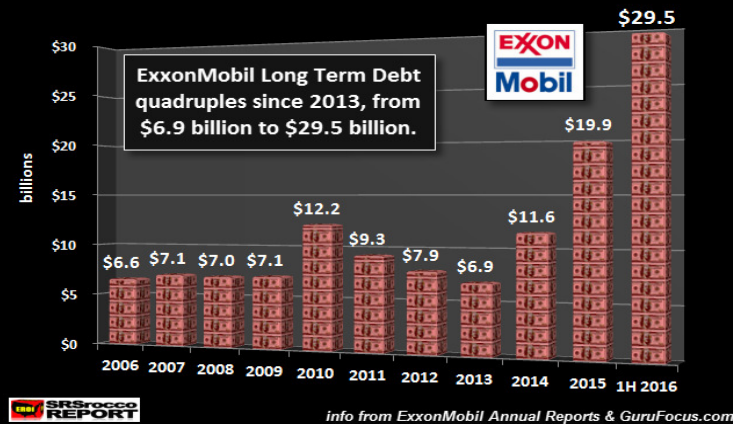
ExxonMobil Free Cash Flow: 2011-2016



ExxonMobil Free Cash Flow Minus Dividends



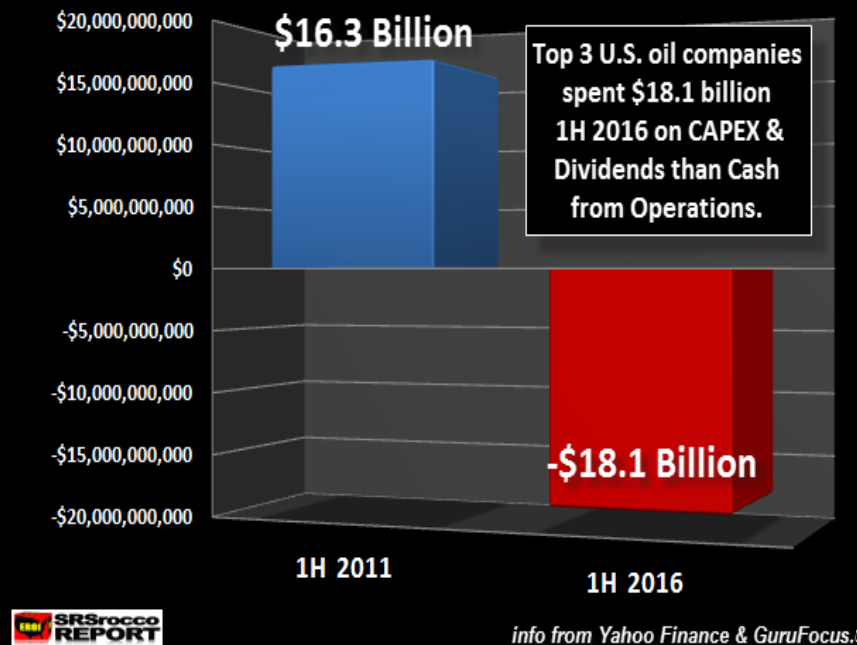
ExxonMobil Long Term Debt: 2006-2016



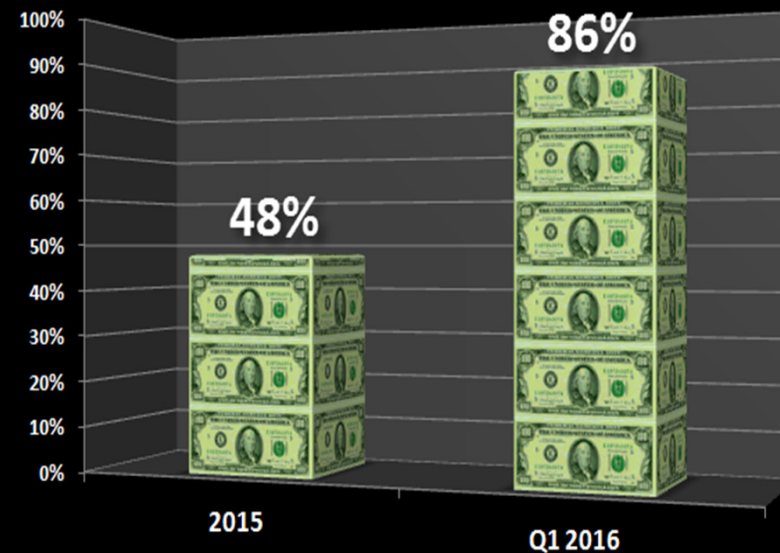
“The Big Oil Show is increasingly fuelled by DEBT (at zero interest rates!). It is cutting exploration, curtailing new projects, cutting costs in many ways but the day of reckoning nears”

Problems with Oil – The Oil Industry is Going Bankrupt

Top 3 U.S. Oil Companies Free Cash Flow - Dividends



U.S. Energy Sector Interest Payment On Debt, Percentage Of Profits



Problems with Oil – The Oil Industry is Going Bankrupt

THE CRUELTY OF CRUDE

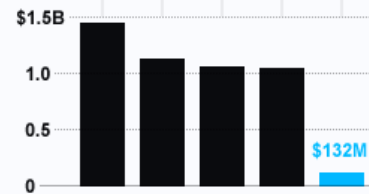
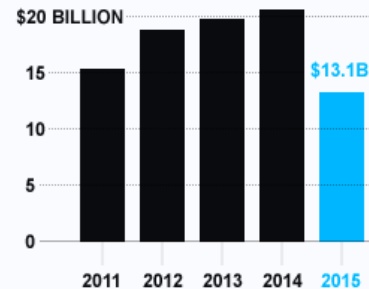
In 2015, falling oil and gas prices and heavy debt loads hammered the balance sheets of the 32 energy companies in the *Fortune* 500.

TOTAL DEBT TO EBITDA RATIO



Source: S&P Global Market Intelligence

MEDIAN SALES

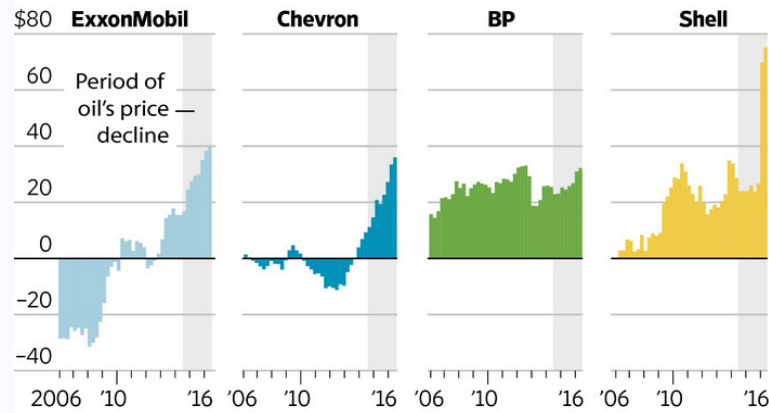


MEDIAN PROFITS

Heavier Load

The world's biggest oil companies are taking on more debt as they struggle with low crude prices.

Net debt in billions, quarterly data

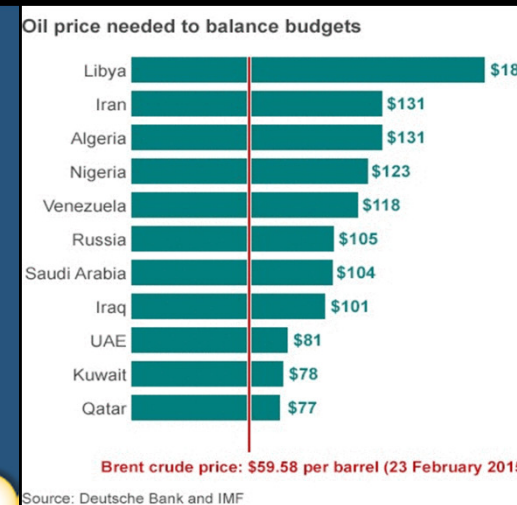
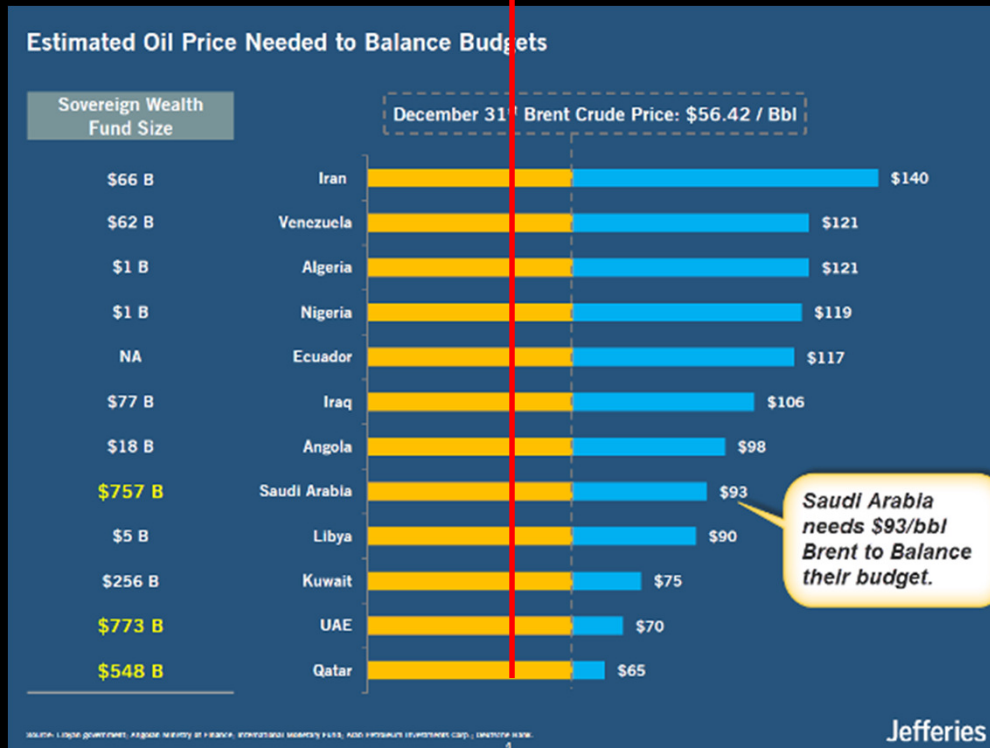


THE WALL STREET JOURNAL.

“In February, the financial services firm Deloitte predicted that over 35 percent of independent oil companies worldwide are likely to declare bankruptcy, potentially followed by a further 30 percent next year—a total of 65 percent of oil firms around the world. Since early last year, already 50 North American oil and gas producers have filed bankruptcy” Nafeez Ahmed 2016

Problems with Oil – Oil Producing COUNTRIES are going bankrupt

2016 - \$45/bbl




Even Saudi Arabia which has one of the cheapest most abundant sources of oil, is rapidly consuming its sovereign wealth fund

NATIONAL OIL COMPANIES OWN >90% OF GLOBAL OIL RESOURCES. THESE CHARTS SHOW HOW FAR THE SITUATION HAS DETERIORATED. THE ECONOMIC COLLAPSE OF MOST OF THESE OIL NATIONS IS INEVITABLE, STARTING WITH THOSE WHOSE ECONOMY/GDP IS DOMINATED BY OIL. ITS WHAT WE ALREADY SEE IN VENEZUELA.

Problems with Oil – The Oil Industry is Going Bankrupt

At a speech at the London School of Economics in February (2016), Jaime Caruana of the Bank for International Settlements said that outstanding loans and bonds for the oil and gas industry had almost

tripled between 2006 and 2014 to a total of \$3 trillion



During this time
oil prices were
mostly above
\$80/bbl

And Again - Sept 2016

Oil market spiral threatens to prick global debt bubble, warns BIS

The Demise of the Global Oil Industry

We are rapidly heading towards a systemic global oil/financial shock

Summary

- Oil is the primary energy resource of the world and fundamental to the global economy.
- The easy oil has been used up. Existing and new reserves require far more energy to extract, refine and deliver. The Energy Return on Energy Invested (EROI) of oil is shrinking rapidly. This is causing a rapid increase in oil industry costs.
- “The 2012 energy half-way point initiated a major change in the petroleum production function. It began a process where the end consumer was no longer able to acquire all the petroleum that the industry produced. More of the energy from petroleum was being committed to the production of petroleum than was being delivered to the consumer. This precipitated the 2014 price decline that reduced prices by 50% (BW Hill 2015).
- The Maximum Consumer Price curve is curtailed at 2020 at \$11.76/ barrel. At this point petroleum will no longer be acting as a significant energy source for the economy. All production from that point forward will be from legacy fields only.
- Within 5 years the global oil industry will be in all sorts of trouble, and oil dependent countries will have collapsed - with very serious consequences for global economy and society.

Problems with Oil – The Oil Industry is Going Bankrupt

Recent Headlines

25/08/16

Independent: Scotland North Sea oil revenues collapse by nearly 100%

Reuters: North Sea oil is not profitable at today's low oil price

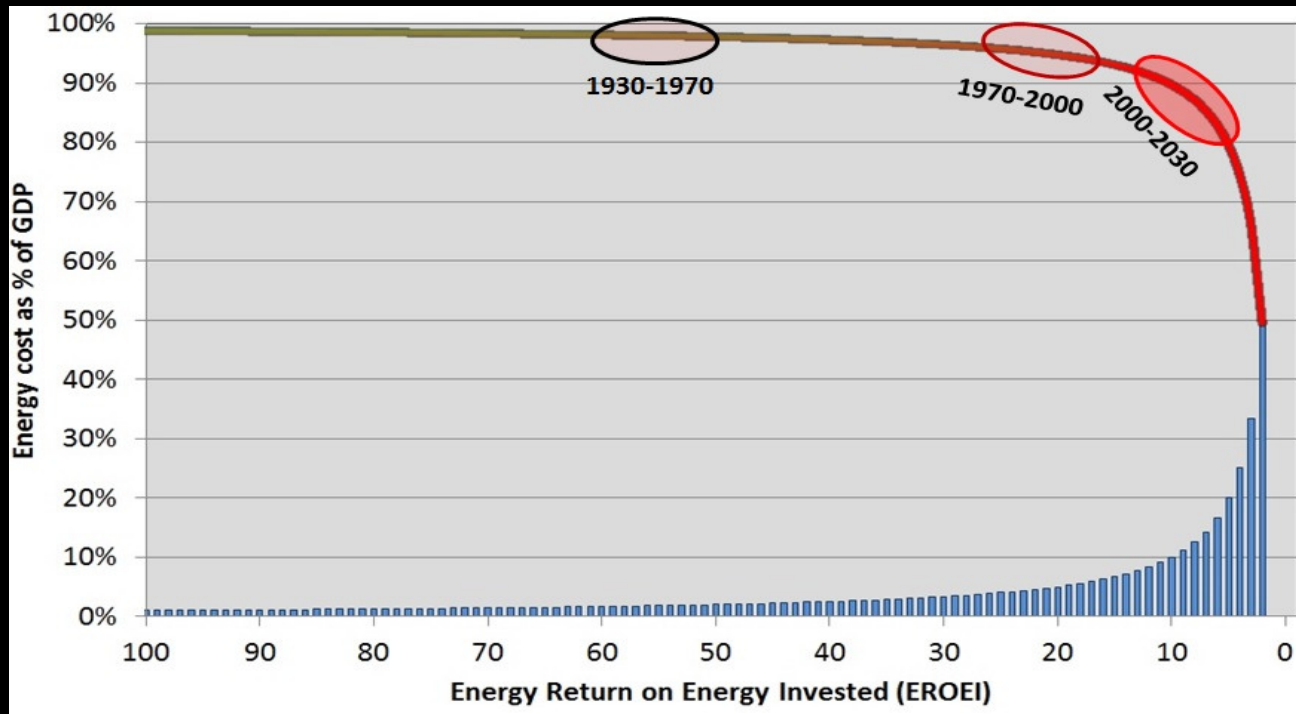
WSJ Business: Big Oil Companies Binge on Debt

Exxon, Shell, BP and Chevron have combined debt of \$184 billion amid two-year slump. *Some of the world's largest energy companies are saddled with their highest debt levels ever as they struggle with low crude prices,* raising worries about their ability to pay dividends and find new barrels.

6.0

Oil, GDP, and Economic Growth

Oil, GDP, and Economic Growth



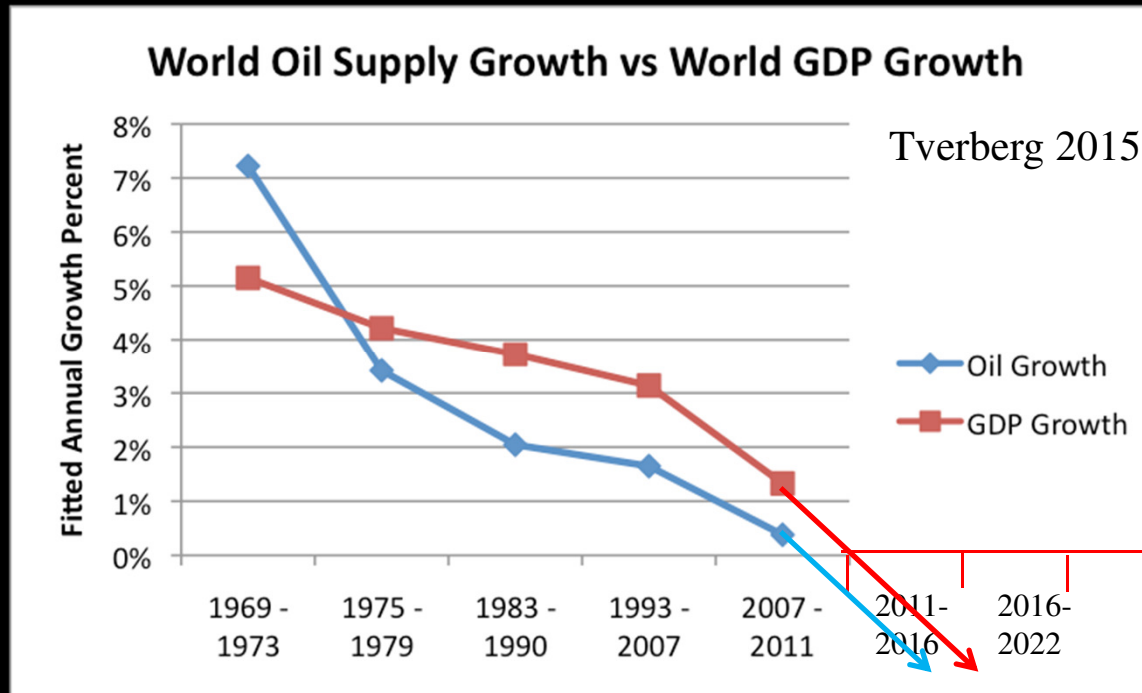
The global economy
CANNOT
GROW
because the
cost of
energy
production is
increasing so
rapidly.

Oil is the backbone of the global economy. As Net Energy from oil declines, so the cost to produce the energy we need increases; requiring an ever larger % of GDP – leaving less and less for other activities. This is happening exponentially.

By 2022, Average net energy available from oil will have depleted to Zero.

(BW Hill, Louis Arnoux)

Oil, GDP, and Economic Growth



According to the European Central Bank data, to generate 1.0 euro of GDP growth, 18.5 euros had to be printed in the QE. (Zero Hedge Sept 2016)

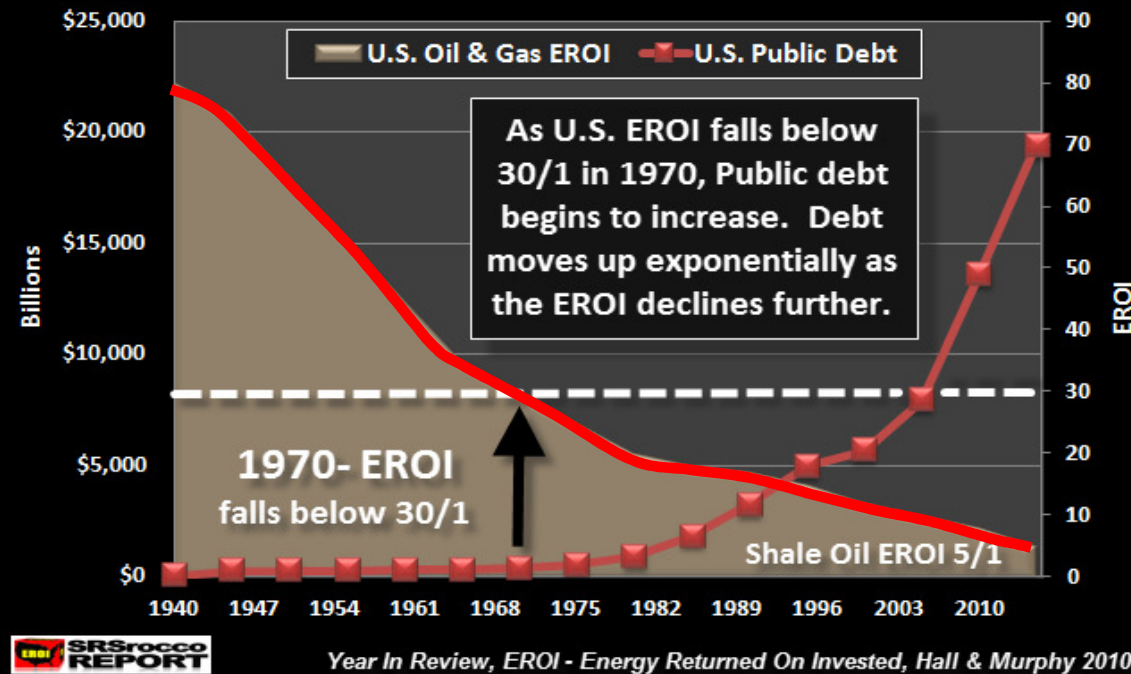
Less Oil = Less GDP

From 2012 onward; Global GDP growth can only be sustained by increasing debt.
(and this is what IS happening)

"The only way the world can keep growing, it would appear, is by piling on debt. Not good, not good at all" Daily Telegraph 2014

Oil, GDP, and Economic Growth

U.S. Public Debt vs U.S. Oil & Gas EROI



Declining EROEI and net energy from oil is a major factor in the exponential rise in public debt worldwide

THERE CAN BE NO RECOVERY WHILE WE ARE SO DEPENDENT ON OIL.

Oil, GDP, and Economic Growth

The Peak & Decline Of International Reserves Warns Of Massive Asset Deflation Ahead



“The world is sitting at the edge of a massive deflationary cliff. Even though Central Banks are desperately trying to keep the world’s financial assets from plunging down into the great depression, signs suggest they are losing the battle. The low oil price is having a profound impact on International Reserves as the low oil price gutted the energy-commodity-goods producing countries. These are the countries that hold the majority of International Reserves. So, as the price of oil continued to stay below \$50 a barrel, these countries have had to sell Bonds and acquire cash to fund their own domestic account deficits” SRSRocco Nov 2016.

7.0

Debt is Crushing the Global Economy

Debt is Crushing the Global Economy

Rising Global Debt and the Deflation Threat

By George Mellon

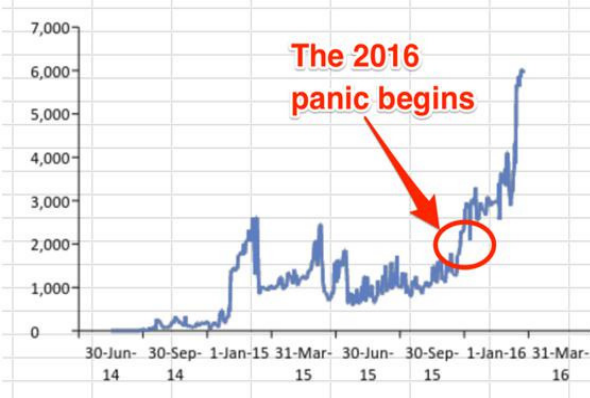
Franklin D. Roosevelt's March 1933 inaugural line "that the only thing we have to fear is fear itself" was inspiring, but wrong. There was plenty to fear, not least the deflation that then gripped the nation. Today we're in a new age of anxiety, with voters asking for and receiving answers to account that

explained how deflation could result from an abnormal building of debt. A 1933 inaugural line "that the only thing we have to fear is fear itself" was inspiring, but wrong. There was plenty to fear, not least the deflation that then gripped the nation. Today we're in a new age of anxiety, with voters asking for and receiving answers to account that

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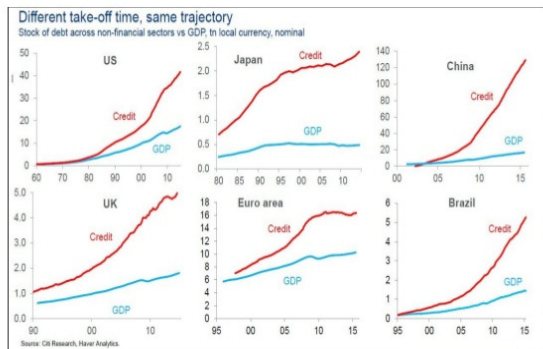
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The Global Market for Negative Interest Rate Debt (in Billions of USD)
Source: J.P. Morgan via Business Insider

valbury
PT, Valbury Asia Futures

A "Saturated World"

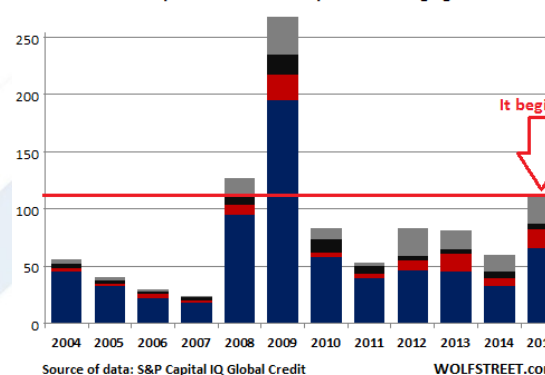


Global Central Bank Balance Sheet

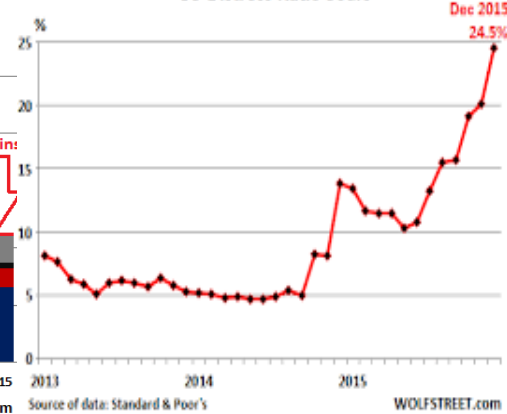


It Begins: 2015 Global Corporate Defaults Jump 87%

■ US ■ Europe ■ Other Developed ■ Emerging Markets



Standard & Poor's US Distress Ratio Soars



23/12/2016

WasteWorks

54

Debt is Crushing the Global Economy

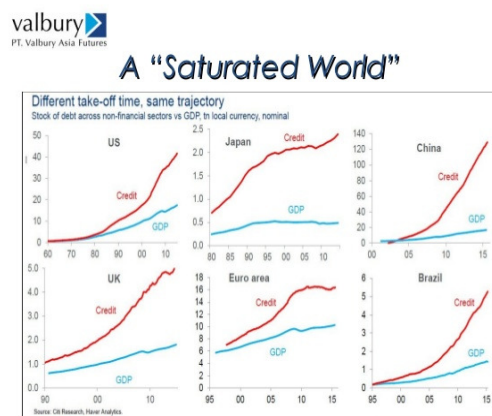
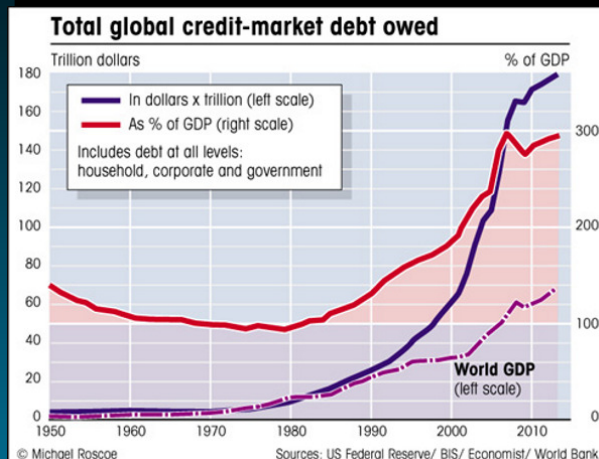
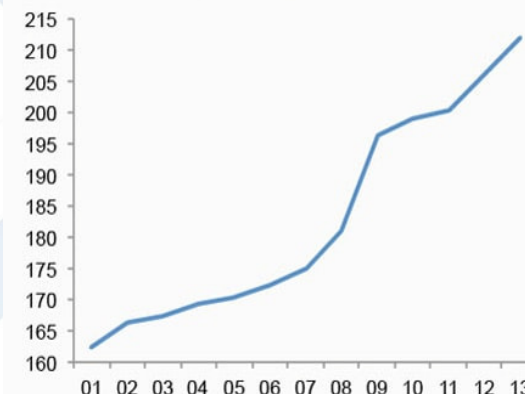


Figure 1. Global debt-to-GDP ratio, 2001-13



“The global debt reckoning – Total global debt at \$230 trillion. Total world debt over 300 percent annual GDP. There is no escape from a reckoning with debt markets (*My Budget 360*) We are likely well above a total global debt of \$230 trillion based on a comprehensive study done by ING last year. The [banking sector rummages](#) for every possible way of accessing debt. Global central banks from the Fed to the ECB to the Bank of Japan are now fully engaged in a digital printing end game”.

In 2000, every \$2.4 of debt creation produced \$1 of GDP growth. Today that figure is up to \$4.6 for every \$1 of GDP growth.

Debt is growing exponentially faster than GDP growth

Debt is Crushing the Global Economy

valbury
PT. Valbury Asia Futures

Global Stock of Debt Outstanding (\$ trillion, constant 2013 exchange rates)

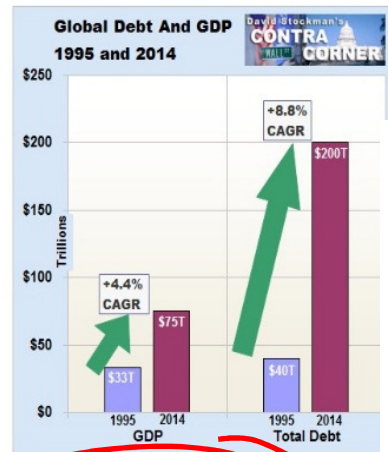
	\$57 trillion increase	199	Total	Compound Annual Growth Rate, %	
				2000-07	2007-14 ²
	142	40	Household	8.5	2.8
	33	56	Corporate	5.7	5.9
	38	58	Government	5.8	9.3
	26	33	Financial	9.4	2.9
	22	37			
	20	45			
Q4 2000	Q4 2007 ¹	Q4 2014 ²	Total debt as a share of GDP		
246%	269%	286%			

¹ Figures do not sum to total, because of rounding.

² Q4 2014 data for advanced economies and China; Q4 2012 data for other developing countries.

Sources: Bank for International Settlements, Haver Analytics, International Monetary Fund World Economic Outlook, McKinsey Global Institute analysis, Mervin Morning, Staff Research

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an astronomical \$199 trillion, representing \$27,200 owed for every single human on the planet.

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A World On The Edge Of Total Collapse



I will close by reiterating that investors have to be extremely careful here. Protect yourself – **PREPARE FOR THE WORST AND HOPE FOR THE BEST.**

At least this Asian Financial Company is telling it like it is

Debt is not a problem as long as the debtor has sufficient cash flow to cover debt service (interest). The principal? Well as long as the country, the corporation or the individual has sufficient resources and the capability to service the debt, the debt most likely is just rolled over. The problems start when the country, the corporation or the individual no longer has the capability to service the debt let alone have the resources to pay it back.

Debt is Crushing the Global Economy

Recent News

**“Mass default looms as world sinks beneath a sea of debt
Global debt is still rising strongly, crimping growth and threatening defaults
around the world”**

Daily Telegraph 2015

Wolf Richter: World Trade Falls for Second Quarter in a Row

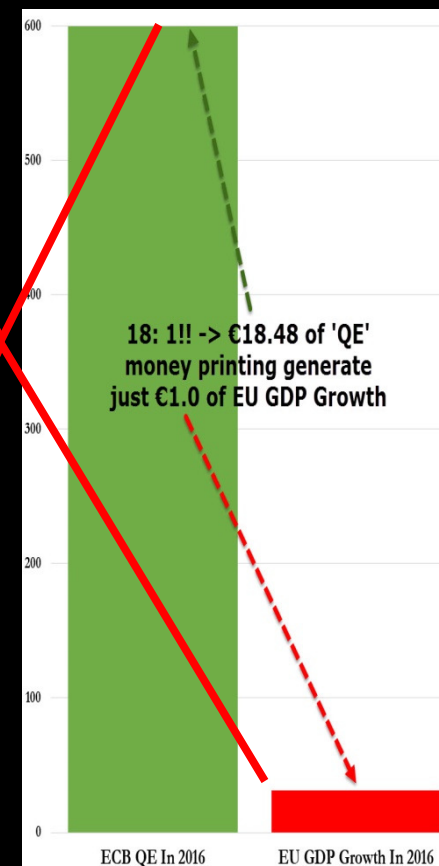
Bloomberg: Real World Economy has a Deflation Problem.

- Emerging Market Debt Up 24% In 2015 To \$18 Trillion (VW)
- China Caught In 'Dead Money' Trap; PBOC Pleads For Fiscal Stimulus (AEP)
 - China's Best-Performing Bank A 'Mirage' Of Shadow Lending (BBG)
 - More Than 1.5 Million UK Households In Extreme Debt (G.)
- **Global Central Banks Are All-In: QE Running At Record \$180 Billion Per Month (And Rising) ZH 09-2016**
- **China facing full-blown banking crisis, world's top financial watchdog warns Telegraph 09-2016**

Debt is Crushing the Global Economy

Implications - The Economy

- *Economic growth (which is oil energy dependent) is over.*
- *Currently global debt is growing 4 x faster than GDP. The **mirage of growth** is being sustained ONLY by rapidly increasing debt in ALL sectors, household (credit card/mortgage/student), business/corporate, and state. Central banks are doing everything they can to keep this mirage going, to sustain growth at all costs including NIRP and QE (money "printing" by the way is not free – its more debt)*
- *"Economic output must expand at a rate that exceeds expansion of debt, or the economy will contract – while debt continues to expand. Once that begins to occur it is a black-hole event from which you cannot escape" Market.ticker.org Sept 2016*
- *There is only one conclusion to this process. The indications are rampant.*

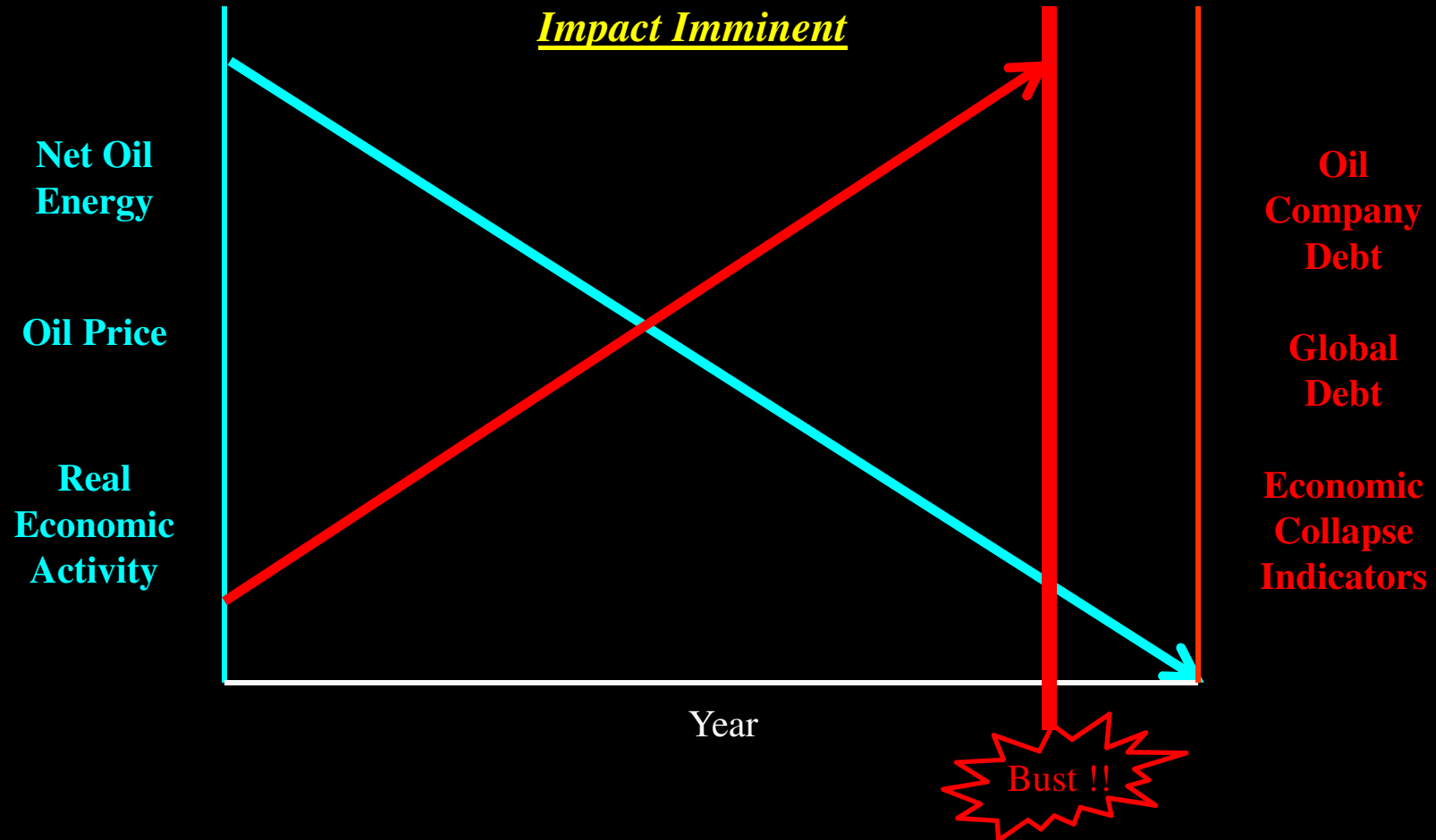


EU Growth in 2016!
A BIG JOKE 58

Summary

The Oil Age is Ending

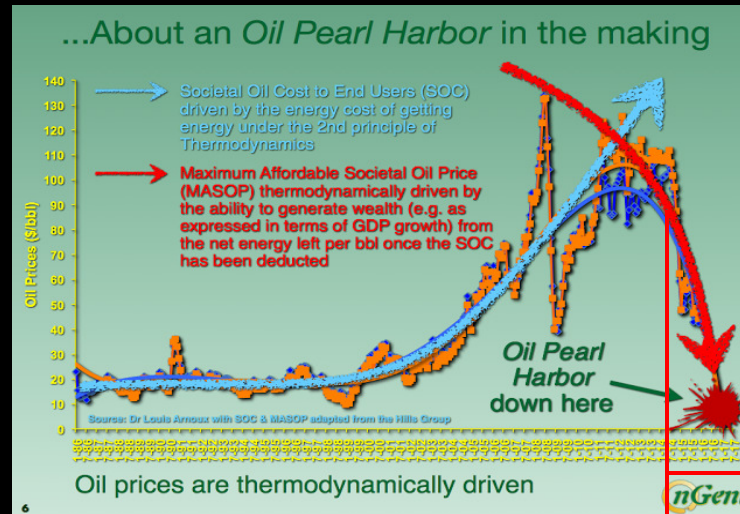
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8.0

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Interpretation of
BW Hills graph
by
Dr Louis Arnoux,
2016

2016

“Historically, petroleum has been a primary beneficiary to the economy. The economic activity that it powered was greater than the cost of the petroleum. That benefit is now declining, and by the early 2020's an increased use of petroleum will no longer add to GDP.”

“The Maximum Consumer Price curve is curtailed at 2020 at \$11.76/ barrel. At this point petroleum will no longer be acting as a significant energy source for the economy. All production from that point forward will be from legacy fields only. The economic impact that will result from the energy lost to the general economy is beyond the scope of this report.”

The Hills Group “Depletion: A Determination of the Worlds Petroleum Reserve”

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**Iceberg=Depletion
Fate of the Oil Age
GOI RIP 2020-2025**



We are unavoidably heading for this iceberg.
It is too late to avoid, but if we act with sufficient
determination and speed now, maybe we can avoid the
worst effects on society

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Think of the Global Economy as the Titanic

The Captain and the owners (politicians, economists, corporate leaders) were warned many times (Limits to Growth 1973, Peak Oil, etc) that the course chosen (endless growth) would take the ship into dangerous waters (end of economic growth), but the stakes were high; reputations and money were at stake (corporate profits, political power); so - carry on regardless - full-steam ahead. The Titanic has now collided with the iceberg and is mortally holed; but still it carries on steaming with all the lights on. People on the deck (us) are still partying (taking on debt at fantastic rates) unaware of what is going on below decks; but water (thermodynamic depletion of oil energy, exponential unsustainable debt) is coming in fast.

The pumps (the real economy) are not keeping up (all indications of global trade are in decline) and the Titanic is sinking (exponential debt is overwhelming the global financial system). The pumps need energy (Oil: which powers 97% of transport, extraction and production of commodities including other energy sources, food etc), but this energy is depleting fast (EROI) and within a short time there will not be enough affordable energy for the pumps, which will slow, and water (debt) will pour rapidly in to flood the ship (financial contagion, derivatives exploding, banks collapsing).

The Titanic (Global Economy), deemed unsinkable IS SINKING – fast.

We will not be aware of this until the cold water laps at our feet and the lights go out. Some people (BW Hill, Dr Arnoux, Richard Heinberg, and many others too numerous to mention) are shouting to the rest (society) to man the lifeboats (prepare for a systemic shock to the oil/energy/financial system) while there is still time. Who will listen?

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*We Could Be Witnessing The
Death of the Fossil Fuel Industry.
Will It Take the Rest of the Economy Down With It?*

By [Nafeez Ahmed](#) / [AlterNet](#)

April 22, 2016

*The Oil Age is finishing now, not in a slow, smooth, long slide down
from “Peak Oil”, but in a rapid fizzling out of net energy. The rapid
end of the Oil Age began in 2012
and will be over within some 10 years
(2022)*

Dr Louis Arnoux Aug 2016

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"The problem of eroding energy profitability is hard to deal with partly because **the decline is happening so fast.** If we had a couple of decades to prepare for falling thermodynamic efficiency, there are things we could do to soften the blow. That's what the peak oil discussion was all about: It was an effort to warn society ahead of time. Once the dynamic of declining energy profitability really gets rolling, adaptation becomes much more difficult.

Oil no longer provides as much of a stimulus to the economy, which just can't grow as it did before, and this in turn sets in motion a self-reinforcing feedback loop of stagnating or falling labour productivity, falling wages, falling consumption, reduced ability to re-pay debt, failure to invest in future energy productivity, falling energy supplies, falling tax revenues, and so on. How long can **debt continue to substitute for energy** before the next traumatic phase of this feedback process begins in earnest? That's anybody's guess, but our window for action is likely **months or years**, not decades".

Richard Heinberg August 2016

<https://psmag.com/is-the-oil-industry-dying-49841d0f6641#.oqb0e86ha>

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The combination of a global economy whose growth is maintained only by exponentially increasing amounts of debt (that can never be repaid) and rapidly declining net oil energy is leading us unavoidably to a systemic collapse of the economic/energy system within the next five years.

“That will have us wondering why we allowed ourselves to sleepwalk through the last few years.”

Curt Cobb. Resource Insights 04-11-14

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We are rapidly approaching a turning point in the
History of Industrial Civilisation

*“Limits to Growth” was right.
New research shows we're nearing collapse
Guardian 2014*

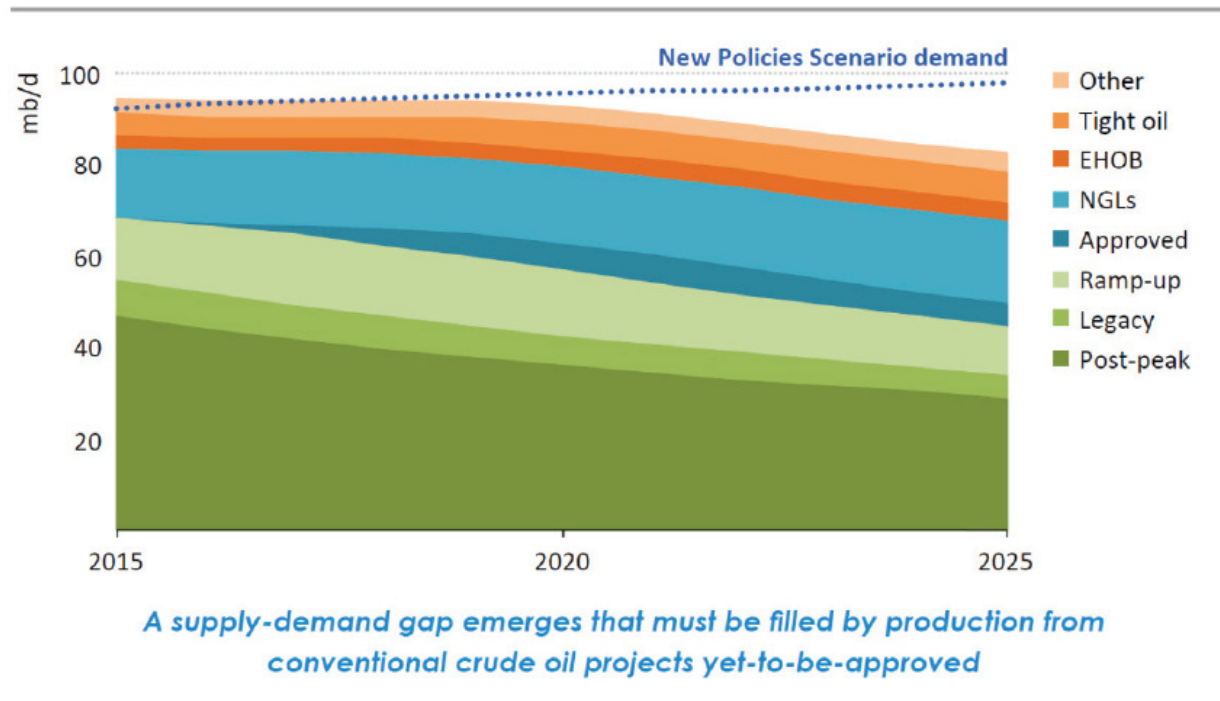
Four decades after the book was published, Limits to Growth's forecasts have been vindicated by new Australian research. Expect the early stages of global collapse to start appearing soon.

“In particular, contemporary peak oil issues and analysis of net energy, or energy return on (energy) invested, support the Limits to Growth modelling of resource constraints underlying the collapse” Melbourne
Sustainable Society Institute 2014

We need to prepare – Now

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Figure 3.16 ▷ Global supply outlook from selected sources in the New Policies Scenario



For the first time, the IEA has admitted that global “all liquids” oil production could start falling any day now

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The credit crisis exemplifies society's difficulties in the timely management of risks outside our experience or immediate concerns. **even when such risks are well signposted.** We have passed or are close to passing the peak of global oil production. Our civilisation is structurally unstable to an energy withdrawal. There is a high probability that our integrated and globalised civilisation is on the cusp of a fast and near-term collapse.

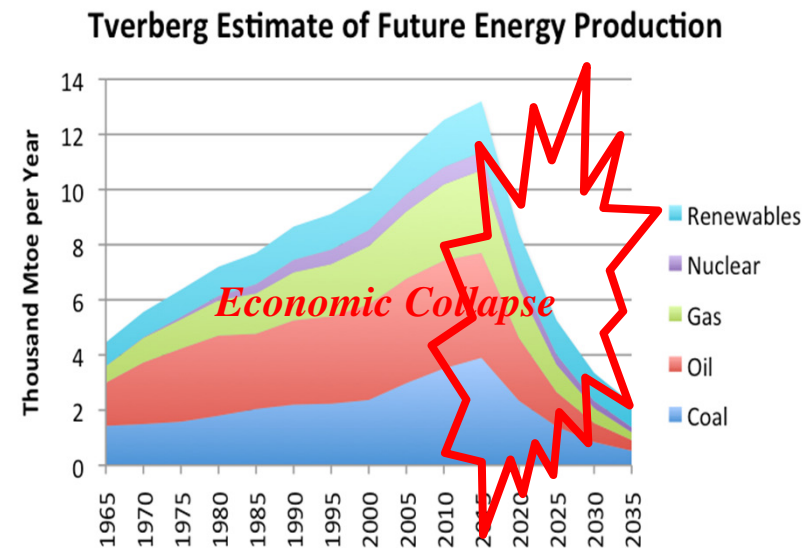
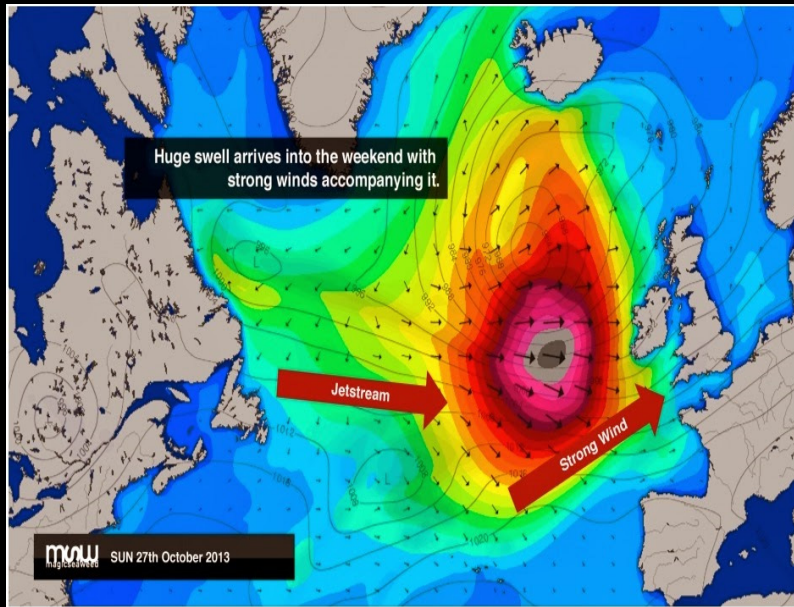
One of the effects of massive credit over-expansion and/or the peaking of global oil production is the growing risk of a **global systemic financial shock.** The likelihood, as with so many financial crises of the past, is that the breakdown of the global financial system will be sudden and catastrophic, marked by complacency and hope turning to fear and panic. It would happen over hours and days.

We are locked into an unimaginably complex predicament and a system of dependency whose future seems at growing risk. **To avoid catastrophe we must prepare for failure.**

“We are at the cusp of rapid and severely disruptive changes. From now on the risk of entering collapse must be considered significant and rising”

*D.Korowicz. 2010: Tipping Point - A Study in Global Systemic Collapse
(Feasta Ireland)*

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Ireland urgently needs to plan for the approaching storm – a massive “discontinuity” in the global energy and financial system. We need to do this at all levels; individual, community, region and state.

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SOME SUGGESTIONS - WHAT WE NEED TO DO NOW!

Transport

- Convert all commercial vehicles to dual-fuel diesel CNG and install CNG filling stations around the country (temporary relief because we don't have endless gas).
- Cars/small vans change to electric
- More public transport powered by renewables

Agriculture

- Conversion of tractors to CNG
- Implementation of biogas plant (grass based) to produce BioCNG and electricity baseload
- Switch to organic non-chemical based agriculture
- Increase local production and distribution of food throughout Ireland
- Massively expand biomass/wood production for heat and electricity baseload

Heat

- STOP USING OIL! Change to biomass, heat pumps, reduce heat loss, etc

Electricity

- Expedite changes to the grid to enable distributed generation, massively speed up installation of baseload from renewables (biogas/biomass etc)

National Pension Fund

- National Energy Bond. Urgent strategic change in investments to enable the above, reduce exposure to certain losses

Educate and prepare Irish society for an economic and energy shock

- Despite the warnings - *we were not prepared for 2008, the next one will be systemic*

Economics

- Devise a new economic system to be on hand to replace the existing one

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"Business as Usual " is no longer possible



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***WE URGENTLY NEED TO START MAKING CHANGES AND
PREPARING FOR AN ENERGY AND FINANCIAL STORM
AT ALL LEVELS OF SOCIETY; INDIVIDUAL, BUSINESS,
PUBLIC BODY AND GOVERNMENT.***

TIME IS SHORT