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
"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).

"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
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

Energy and GDP are Dependent on OIL

The Economic System is Dependent on OIL
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

OIL is the weak link in the production and delivery of virtually all other forms of energy, commodities, food, goods and services.

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**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
“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.

Figure 2. Effect of EROI on Total Energy Extracted.

1910

2016

DIG
Oil sand is scooped out of a giant mine and deposited onto conveyor, 400 ton trucks.

CRUSH & MOVE
Bitumen rich sand is ground in a ore comminution plant before being sent by pipeline to the primary upgrading plant.

EXTRACT
During the primary extraction process, the oil sand is placed in a giant tank where oil bitumen is separated from sand and water.

DILUTE
Oil bitumen is mixed with sulfite, a chemical solvent, to remove remaining minerals and water.

UPGRADE
To create synthetic crude oil, the bitumen is heated to 500 degrees in giant furnaces, a process that removes excess carbon. Hydrogen is added to prepare it for industrial use.
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
Problems with Oil - EROEI

BW Hill (2015)
Depletion - A Determination of the Worlds Petroleum Reserve
“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.
“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!
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.

2017
Problems with Oil - EROEI

Scraping the bottom of the barrel

- Within 10 years the Oil Industry will have disintegrated with major implications for all other energy resources & for the industrial world at large that is ~95% dependent on oil for all forms of transports.
- This threat is entirely driven by the thermodynamics of resource depletion & has nothing to do with finance.
- It is combining with climate change, air pollution, other ecological threats & global debt issues to create a “Perfect Storm”.

Unavoidable Waste Heat (2nd Principle of thermodynamics)
Energy Costs of Exploration, Extraction, Transport, Processing & Distributing End-Products

Net Energy Available for GDP Growth

1900 2015 e 2022

61% 8% 0%

1920 2015 2022 RIP
“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
“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
“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

Diminishing NET energy ~> Increasing production cost

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

Long run cost of supply to get 12% IRR

Note: IRR=Internal rate of return. Source: Barclays Capital Equity Research
Problems with Oil – Increasing Cost of Production

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.

Exxon Mobil
Royal Dutch Shell
Chevron

Capital expenditures
Production

Note: Spending in 2013 reflects company estimates; for Shell it is net of asset sales; production data 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%

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 $E_T P$ model

A reserve status report
Report# HC3-433
Version 2
March 1, 2015

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
“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

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5.0

Problems with Oil
The Oil Industry is Going Bankrupt

![Graph showing comparison of price needed and ability to pay over years](image)
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”.

“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

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

2016 - virtually the whole global oil industry is operating at a loss !!!
Problems with Oil – The Oil Industry is Going Bankrupt

![Energy Sector Debt-to-EBITDA Ratio](image)

Although the last quarter returns were only filed in the last three weeks or so, they are plotted time displaced so that earnings at the then prevailing oil price can be compared on a vertical basis.

The Debt-to-EBITDA ratio is calculated on a quarterly basis with the quarterly earnings multiplied by four.
Problems with Oil – The Oil Industry is Going Bankrupt

“*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

“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”

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Problems with Oil – The Oil Industry is Going Bankrupt

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

- Top 3 U.S. oil companies spent $18.1 billion in CAPEX & Dividends than Cash from Operations.

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

- 2015: 48%
- Q1 2016: 86%

Info compiled by FactSheet & YahooFinance
"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
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.
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 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)
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
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.
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.
Debt is Crushing the Global Economy
Debt is Crushing the Global Economy

Global Central Bank Balance Sheet

Global Developed Sovereign Bond Yield

The 2016 panic begins

A "Saturated World"

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“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 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

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

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

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Summary

The Oil Age is Ending

Impact Imminent

Net Oil Energy

Oil Price

Real Economic Activity

Year

Oil Company Debt

Global Debt

Economic Collapse Indicators

Bust !!
8.0

IMPACT IMMINENT
“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”
Impact Imminent

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.
**Impact Imminent**

**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?
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
"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](https://psmag.com/is-the-oil-industry-dying-49841d0f6641#.oqb0e86ha)
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*
Impact Imminent

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
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)
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
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