Peak Natural Resources

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You can never get enough of things you don’t need

Everything we want is made from raw materials

We are conditioned to believe there are no limits and growth is our reason to be
Most of what we want is manufactured.
From raw materials extracted from the Earth
Using energy
Which is generated by burning raw materials extracted from the Earth
Dynamic Self Regulating Finite System

This system is not growing and has been stable for some time.
Exponential growth in a finite system is not sustainable

Consumption of all natural resources are following this basic pattern over time
Production is Increasing

Driven by increasing demand
48% Decrease in Multifactor Productivity

The efficiency in which capital, labour, materials, services, and energy are utilised to generate a unit of product

Conventional mining practice is struggling to remain economically viable.
Metal Price Cost (Indexed to the year 2000)

ABS 1350.0 Financial Markets - Long term

ABARES - Australian Mineral Statistics March 2011
Peak Conventional Oil Production - 2006

Source: Nature 26 Jan 2012, Vol 481 Comment

International Energy Agency

China industrial demand dominated the rest of the planet

China now dominates manufacturing and resource consumption
We are 8 years into an era of industrial transformation

Chinese industrial demand

Oil supply became inelastic
Total Mining costs have also risen

[Graph showing the increase in total income and expenses over the years from 1992-93 to 2009-10]

ABS 1350.0 Financial Markets - Long term

ABARES - Australian Mineral Statistics March 2011
Mining Energy Consumption

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) 2008

Energy consumption in mining increased 450% in the last 40 years
Zittel, W. et al, Fossil and Nuclear Fuels – the supply outlook Energy Watch Group March 2013

CSG and shale gas has pushed Peak Gas back from approx. 2010
Peak Oil

Zittel, W. et al, Fossil and Nuclear Fuels – the supply outlook Energy Watch Group March 2013

Tar and oil sands have pushed back the peak of total oil supply back 6-7 years from approx. 2006
Peak Coal

Zittel, W. et al, Fossil and Nuclear Fuels – the supply outlook _Energy Watch Group March 2013

Peak date contingent on China selling us their coal
Future projection of Uranium production

Nuclear power would have to increase 12-13 times capacity at peak potential to make up for total energy supply to replace fossil fuels. 

Zittel, W. et al, Fossil and Nuclear Fuels – the supply outlook _ Energy Watch Group March 2013
Existing nuclear infrastructure needs replacing

Required construction starts of new power plants to meet NEA forecast of nuclear capacity and to sustain current level

Each new reactor sites takes 5-15 years to construct

Someone has to finance each one
Storage of spent fuel rods

- Spent fuel rods are very radioactive and generate a lot of heat
- Need to be stored in cooled water for 10-20 years before dry storage

When U peaks production, coal gas and oil will have already peaked

This is the Achilles Heel of nuclear technology as a solution to our energy supply problem
World supply of fossil fuels and uranium

Zittel, W. et al, Fossil and Nuclear Fuels – the supply outlook _Energy Watch Group March 2013

Peak energy approx. 2017

Industrialisation in a global context will soon tip into contracting economies - the end of growth based economics
U.S. “gasoline consumption” – as measured by the U.S. Energy Information Administration (EIA) – has plummeted by nearly 75%

Source: Zero Hedge, Submitted by Jeff Nielsen via BullionBullsCanada blog
Food and civil unrest

Inability to buy food correlates with civil unrest
Food and the price of oil

Adapted from DECPG data.
Industrial agriculture is failing

• Petro-chemical fertilisers and herbicides are increasingly less effective, requiring more each year for the same output

• Every year, 0.3–0.8% of global arable land (75 billion tons of fertile soil) disappear/year and is rendered unsuitable for agricultural production

• 52% of the land used for agriculture is moderately or severely affected by soil degradation

• Arable land loss estimated at 30 to 35 times the historical rate

• In Australia, organic matter humus content has fallen from approx. 5% to less than 1% (needs to be approx. 20%)

Conventional food sources are in the process of failing
Corporate culture genuinely does not know where to start to instigate a major shake-up of technology and approach; instead across the board, focus has been on short term risk aversion.
The Industrial Big Picture

Expansion of production needed to stay viable
- Decreasing Grade
- Decreasing Grind size
- Increasing Depth
- Peak Fossil Fuel

Expansion of money needed to service debt
- Sovereign Debt Default
- FIAT Currency Devaluation
- Credit Freeze
- Structural Inflation

Peak Mining
Peak Finance
Peak Manufacturing
Peak Industrialisation

The End of the Industrial Revolution
160 years after it started
With 20/20 hindsight

Where we should be
- Fundamental Reform
- Mounting Stress
- Early small scale crisis
- Deterioration and Fragmentation
- Inelastic oil supply 2005

Where we are
- All 5 Stages of Human Grief at all scales
- Understand true implications
- Mounting Stress
- Early small scale crisis
- Deterioration and Fragmentation

This diagnoses a certain outcome
The writing on the wall

- Everything we need/want to operate is drawn from non-renewable natural resources in a finite system.
- Most of those natural resources are depleting or will soon.
- Demand for everything we need/want is expanding fast.
- When these trends meet, there will come a point where how we do things will fundamentally change.
- None of these issues can be seen in isolation.
The most difficult but significant task in front of us is a revolution in perception and a restructuring of social responsibility.
Questions???

My wife and I in 40 years time
(its up to you to keep up)
Thank you for your time

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