The Infinite Resource

By Ramez Naam

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“The day we achieved the ability to create sophisticated ideas and to communicate them clearly to one another, our universe changed.”

-Ramez Naam pg. 106
The Best of Times

- The Rise of Innovation
- The Incredible Present
The Rise of Innovation

- The Renaissance Period in Europe:
  - The Most spectacular explosion of innovations the world had seen
  - Discoveries, inventions, political and philosophical writings all birthed the Scientific Revolution, the Industrial Revolution, and the Enlightenment.
  - Introduced the discoveries of the use of electricity, the germ theory of disease, the discovery of the laws of chemistry and physics, the development of steam engine, etc.

- China in the early 13th century:
  - Invented paper, wood block printing, and gunpowder. First to use paper currency.

- Darwinism evolutionary view of innovation:
  - Ideas are copied from person to person and place to place. “Idea sex” - passing fit info
  - Input to natural selection theory, ideas would spread from mind to mind until someone would further improve or encounter another idea upon them.

  For example, the invention of movable type printing press of the Renaissance accelerated the spread of innovation/ideas; thus increased our access to energy, ability to grow food, and the development of medicine, and science, and other domains that enhanced our lives.
The Incredible Present

- Countries have highest levels of wealth ever realized.
- Since 1950, the life expectancy around the world has risen by more than 20 years.
- The rate of poverty is on decline.
- Fewer people are malnourished.
- Even though the common fear used to be that rising population would result in lack of food, our food supplies are actually on the rise and grow at an even faster rate than population.
- Average education of students in the world is also on the rise, even in the least-developing part of the world.
- Human development index is higher.
- Greater equality is on the rise.
Life Expectancy at Birth, 1950-2010.

Source: UN World Population Prospects, 2012 Revision.
The Worst of Times

- Peak Oil
- The Greenhouse Earth
- End of the Party?
Peak Oil

- The high demand and low supplies of oil has caused the increase in price.
- New discoveries of oil have been lower than oil production since the late 1980s, therefore still creating shortage of oil.

- Unconventional oil - oil sands:
  - It’s made up of bitumen (asphalt) and take much effort of expensive strip mining, high water used, and high energy to harvest.
Throughout decades, climate change in global warming has been posing a threat to the environment of earth as well as the lives of human being. The temperature records shown that the planet has warmed around 2.5 degrees Fahrenheit since the 1850s. Around half of the warming Fahrenheit occurred in 1970. The increase in climate can create flood, drought, hurricane, wildfires, and heat waves in different areas of the earth.

Methane:
- Methane is the greenhouse gas that is much more powerful than carbon dioxide.
- Every ton of methane traps more than 100 times the heat of a ton of carbon dioxide does.
- As methane is frozen and buried in the cold regions, the increase of climate can potentially melt the frozen methane and accelerate a much more powerful warming effect on earth.
End of the Party?

- According to the book “The End of Growth”, if the earth’s capacity reach its limit while population and demand raise, then growth will eventually ends.
- Once growth ends, our economy will reach zero sum - one nation’s gains comes from another’s loss.
The Power of Ideas

- Doom
  - *The Limits to Growth*
  - *An Essay on the Limits of Populations*
  - *Population Bomb*
  - *Famine 1975!*

These are all books that predicted human doom, however they were wrong human ingenuity proved to be the most powerful weapon to combat things like overpopulation, low life expectancy and other issues that threatened human survival.
Solutions:

Increase efficiency not land

The Green Revolution

- Agricultural innovation- reduction of land use impact-
  - ex: before one square mile of land fed less than one person, today it feeds 1,300 people
- Greater food production
- Solar Power
- Farming the seas

Problems:

- greenhouse effect- CO2 emissions from agricultural practice (cows = methane, farm equipment)
- fresh water depletion- from
- over fishing
- nitrogen fertilizer- creates dead zones for fish
- Pesticides- used to kill harmful insects and protect crops but kills animals and spreads into water supplies
The Transformer

- The materials that make up an iPhone do not give it its value. The “recipe” that turns it into a device that can access a large portion of the world’s data, capture images, music, and more is what gives it value.
- The “recipe” took centuries to develop.
- 20 years ago no matter how much money you had the you could not get an iphone, the closest thing to it would have been a bulky computer, or an expensive bulky phone.
- Materials are disposable, knowledge only accumulates.
- Plastics, great material, not an immediate success.
- PVC, Celluloid, Nylon and other plastics
- When put into a “recipe” plastics are very valuable.
The Substitute

- Whale oil would be used for candles, soap machines and many other things.
  - Whales disappeared, oil became harder to attain.
    - 1820’s = $200 a barrel
    - 1855 = $1,500 a barrel

In 1846, Abraham Geshner created Kerosene a substitution for whale oil.
- It was cheaper to produce and more abundant
  - Manure Fertilizer vs Synthetic Fertilizer
  - Diamonds vs Synthetic diamonds
Reducing Pollution through politics
- Laws - Nixon, Environmental Protection Agency
  - Clean Water Act
  - Clean Air Act
  - More today

We still need ideas:
- We need more efficient combustion engines
- 30% of the gasoline in a car moves the car; the rest is lost in inefficiency, friction, and because of the weight of the car.
  (There are electric cars, but they are often expensive, yet it is expected that the price will drop rapidly)
- More green buildings
The Recycler

- Landfills are full of valuable items.
  - British recycling experts say that there are about 100 billion dollars worth of plastic that can be turned into natural gas.
  - Japanese analysts predict that 300 of the earth’s rare metals are contained in landfills.
- However retrieving these items requires intensive labor, requires a lot of energy and is expensive.
- Does it cost more to recycle or to be exposed to chemicals released from items left untouched in the landfills?
- Do we really live in a finite world?
The sun is our energy motor.
  - In one single week the sun can provide us with more energy than the one that we have used throughout human history through coal mining, oil and natural gas production.
- The challenge is in learning how to harness it in a cheap efficient way.
  - Hydropower
  - Wind

Learning Curve - every solar panel built decreases the value of the next one built.
Investing in Ideas

- "Innovation can be the ultimate reducer of cost and multiplier of value"
- Government-funded projects
- Increase funding for clean energy and energy efficiency research
- Invest in education (empowering people through education)
  - All should have a shot at a college degree
  - Reasonable to funnel some minds toward areas in greatest demand and produce innovation
    - (Science/Engineering)
The Flaw in the Market

- Market-based systems > command economies
  - Greater innovation
  - Greater economic growth
  - Greater welfare for those within the system
  - Provides incentive and competition to create useful technologies
  - Driven by self-interest
    - Example: South Korea v. North Korea
The Flaw in the Market

- Tragedy of the commons
  - The accountability for resources is spread over billions
  - Resources are external to the market mechanism
  - Normal market forces do not govern or optimize usage
- The key is to make sure the market directly values the natural resources we care about
Market Solutions

- **Option A:** Auction off the right to emit carbon, and shrink the amount auctioned off each year
- **Option B:** Charge a fee for every ton of carbon emitted, and raise that price each year
- **Three keys to making this work**
  1. Establish a clean, level system devoid of loopholes or giveaways
  2. Give every dollar brought in through auctions or a carbon tax back to the taxpayers
  3. Clarity on the long-term plan
Market Solutions

**Simple plan**

1. tax carbon
2. Incrementally tax carbon emissions over time
3. Tax imports that don’t have a carbon price
4. Give all the money back to tax payers.
Nuclear power is a safer, cleaner energy source than coal-burning power

- Coal-burning produces 100 times as much radiation than nuclear power plants
- World-wide annual deaths from coal-produced pollution: 170,000
- Deaths resulting from Fukushima meltdown: 0
Greener than Green

We have 4 challenges with agriculture

a. How do we solve this?
   ▪ Going Organic is the fastest growing trend
   ▪ GMO has health benefits

b. Resistance
   ▪ Known vs Unknown

“Sometimes, new technology, even though it looks different or frightening, is exactly what we need to embrace in order to survive and thrive.”
The Decoupler

Limits of Growth

1. Population
   a. exponential growth
   b. Plateau

2. Consumption
   a. Jevon’s Paradox - efficiency can increase consumption

3. Wealth (Decoupler)
   a. We are getting richer

“Technology is only the how. It’s not the why.”
Of Mouths and Minds

- Competition brings out the best in us
  - innovation should be encouraged whether it’s in your country or not
  - The best innovation will affect the whole world.
- Population
  - control the population
  - Population growth
    - population = innovation
    - World is becoming more urbanized.
Easy Way, Hard Way

- “Innovation is the ultimate source of wealth.”
- Resources vs Needs.
  - Transition is important for preparation
  - Be open to new ideas
- Man and nature in using resources
  - Humans are a powerful virus
- Solution to our problem
  - Easy Way - Fix it Now, Find new ways
  - Hard Way - Stay the same until it’s too late, then Fix it
- Optimism
  - Humans will always find solution
The End....

Questions?