

# Emerging Realism – Azerbaijan “Post Petroleum” Economic Options

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In the Industrial Age we created wealth by exploiting Natural Resources,

Now in the IT Age we create wealth by Inventing things.....

# The Major Future Economic Issue is EMPLOYMENT

Azerbaijan Agriculture: ~ 5% of GDP but ~ 38% of Work Force. Agriculture is being mechanized worldwide, employment in Agriculture expected to reduce even with sector growth

Oil Sector: ~80% of GDP but very small part of work the jobs.

# Climate Change accelerates shift away from Fossil Carbon Fuels

Positive Feedbacks [Fossil Methane & CO<sub>2</sub>, Acidic Oceans, Albedo Change, Water Evaporation, Etc.] causing major acceleration of the IPCC Climate Change Projections, will result in much faster shift to Energy Renewables, which have massive capacity and costs on a rapid downward spiral.

WORLD WILL MORE Rapidly -- than thought previously -- shift away from Fossil Carbon Fuels

# The Key Technologies are Synergetic

- IT (comms/computing/sensors/electronics/machine intelligence)
- Bio (genomics/molecular biology/designer life forms)
- Nano (coatings/barriers/computers/sensors/materials/“assemblers”)
- Energetics (HEDM (various)/revol. solar/biomass/explosives/propellants/storage)
- Quantum [crypto/computing/sensors/optics/Electronics]
- Societal Technological Systems (motivational asynchronous “distance learning,” immersive/virtual presence, “tele-everything,” “robotic everything,”]

# “Rise of the Machines”

- Machine Intelligence approaching Human via Biomimetics and perhaps emergence
- Autonomous Robotics
- Creating increasing unemployment [manufacturing , now service, soon Intellectual]
- Humans becoming Cyborgs [Retinas, hearts, limbs, brain chips, .....]
- Emergence of a Global Sensor Grid and a “Global Mind” [ Web 3.0++]

“When Industrialization first occurred there were fears of massive unemployment which never happened, Why will the integration of robots into the workforce be any different?”

**“We didn’t create a second intelligent species 150 years ago, now we are doing that with intelligence that will get better and better.....”**

Marshall Brain, Author ‘Robotic Nation’

- We had to “work” to feed ourselves
- It appears we will create/develop machines that will be MUCH more productive than we are...
- Which will create Massive Wealth, relieving us of the need to “work”- this will be a MASSIVE Change in civilization
- Robotics will reduce standards of living for the masses unless the ownership of the machines is somehow “shared”.



# ICT Revolution Impacts on Society

- **Work (at home telecommuting, reduced local/corporal travel)**
- **Shopping (at home web based, (robotic?) delivery)**
- **Entertainment/leisure (at home immersive 3-D interactive/multi-sensory via VR/holographic projection)**
- **Travel (3-D/interactive/multi-sensory tele-travel)**
- **Education (at home low cost asynchronous, web based on-demand, highly motivational, life-long distance learning, .edu)**
- **Health (at home interactive tele-medicine)**
- **Politics (increased real-time virtual involvement of the body politic)**
- **Commerce (tele-commerce already ubiquitous)**
- **Tele-Socialization, Tele -[onsite] Manufacturing**

# Water/Food

- Current food production based on Fresh Water Plants
- We are “running out” of Fresh Water
- Engendered by Population Growth, ~ 50% too many of us for the Ecosystem to support NOW at current level and distribution of living standards, if/as the Rest of the World attains Western Consumption rate will need 4 more planets...  
Not Available
- A Partial “Solution” is to switch to Halophytes [ “Salt Plants”], produce food on wastelands using saline/salt water, 22 nations working this, ‘Solves” Land, water, food, energy and climate change.

# Potential Economic Ways Forward for Azerbaijan

Note - Each of these is both a “Product” going forward AND a “Tool” to attain the Economic Forefront.....

- **Serious Web-Based Asynchronous Distance Education** offered “nearly free” to educate/train EVERYONE at all levels [ “Now Create Wealth by Inventing Things”]. MAJOR improvements in Education “efficiency”, “coverage”/availability and cost Reduction[s]. The need for a more/more widely trained workforce is a key requirement and virtual Education can be provided nearly FREE.

# Ways Forward - Cont.

- Develop/Apply Robotics and Machine Intelligence [ for “Productivity improvements”] as rapidly as feasible, also utilize for Technical/ Competitive/ Market/ Application “Intelligence”. Most efficient/effective approach is to leverage off of the investments of others. [ Replacement value of the worlds technical literature is order of 100 million entries/papers etc times an average of at least \$100,000 per, That product is some \$10 Trillion].

# Ways Forward - Cont.

- Beyond the IT/Bio/Nano Age is the Virtual Age, Tele-EVERYTHING including on-site manufacturing. Exploit/develop this Mega Technology Trend to reduce costs across-the-board, reduced physical travel, improved education, medical care, etc...Soon - 5 senses Virtual Reality/ Immersive Presence .Also - As the populations increasingly operate out of their homes there will be massive opportunities associated with “Enriching” the Physical Home Environment across-the-board

# Ways Forward - Cont.

- Genomic and Synthetic Biology is increasingly critical for [ vast opportunities in]:
  - Human Health Care/ Life Extension [Prevention vice repair]
  - Increased efficiency/reduced costs for biofuels, food and carbon sequestration
  - Living Products”/ Bio-Functionalism and Bio-Production
  - Climate Change Adaptation [ “Take the heat” etc., Atmos. N<sub>2</sub> uptake vice Fertilizer etc...]

# Ways Forward - Cont.

- Renewable Energy :
  - Wind [ Resource Available]
  - Hot Rock/Drilled Geothermal
  - Solar Thermal
  - Nano Plastic Solar PV
  - Biofuels using waste water, saline water and wastelands [ Halophytes, Cyanobacteria]
  - Distributed Generation & Conservation
  - Atmospheric CO<sub>2</sub> to CO [ a fuel] via solar energy processing
  - Exotics [LENR, IECF Aneutronic Fusion, Etc.]

# Ways Forward - Cont.

- Quantum TECHNOLOGY [ Vice Quantum Science] is the current “Beyond Nano” Technology Frontier[s], truly major opportunities across the board in sensors, energy, electronics/photonics, Materials Etc., An opportunity to “Get ahead of the wave”.



# Ways Forward - Cont.

- Water “Management” will be of increasing importance worldwide due to both rising Ocean Levels and An increasing shortage of Fresh Water [ which will be greatly alleviated by shifts to halophyte/saline water agriculture]. Water reclamation, decreasing water requirement[s] of all “flavors” [agriculture via genomics/synthetic bio, domestic [closed cycle systems], Industrial.Part of a larger nascent “industry” associated with Environmental Reclamation/[re]terraforming/ Engineering

# Bottom Line[s]

- To the extent that you invest in CONVENTIONAL INDUSTRIES to provide employment/ Economic Development these will inevitably lose employment due to the ever improving Machines, some [ like agriculture] sooner than others.....
- Need to shift, as you are planning, to a KNOWLEDGE BASED, INNOVATIVE Economy , these jobs will be the last to be taken up by the machines
- There are several specific Frontier Technologies and Industries which you can Pioneer , will require rapid action on several Intellectual fronts as the technology landscape worldwide is essentially Flat, MUCH and Effective Competition....