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### Setting the context

Before considering demographics, job types & location, ageing population etc. the starting point of analysis is the global picture of projected loss of global natural resources and how to combat this impact on Ireland.

A 2007 New Scientist Article from the World Resources Institute listed a large range materials, where they are located and how long they will last.

These are highlighted in article links below:

<https://www.newscientist.com/data/images/archive/2605/26051202.jpg> and  
<https://www.newscientist.com/data/images/archive/2605/26051201.jpg>

The Article (Earth's natural wealth: an audit (23 May 2007) – David Cohen looks at the issues surrounding Platinum resources and then goes on to look at a range of other minerals including indium, tantalum, zinc, copper, nickel, phosphorus, gallium, and uranium.

Going by that research we should be out of Indium in a few years if not already, followed closely by Silver, Antimony, Tin, Zinc and Nickel.

We are also aware of the very finite nature of Oil and Gas resources from the work of several organisations including Irish initiated ASPO. Most of the baseline data is from circa 2005 but they pretty much all show the same trend as seen in the graphic <http://www.peakoil.net/uhdsg/>. The data shows that we are more or less at the end of the cheap less dirty, easier to extract resources. There has been no extra discovery since then of the filthiest fuels such as tar sands; that resource is probably determined accurately. Fracking gas if continued extraction is allowed may have been underestimated and may extend gas resources by a few years (some analysis suggests fracking gas resources have been considerably exaggerated). So there may be a few more years than determined in the mid 2000's. The salient point is regardless of any brief extension period, these resources are very much finite and will get very expensive once production constraints for meeting demand become a real problem. We in Ireland( and indeed Europe) don't want to become a slave to oil and gas prices.

**More importantly** the very stark reality of Climate Change means that in order to meet our Paris commitments and stay below 2 degrees warming the vast majority of declared reserves need to stay in the ground (ref. <http://www.bbc.com/news/science-environment-30709211>).

Additionally the world's soil is depleting from over intensive agricultural use. Particularly the impact of high yield approach on trace minerals has been overlooked. Plants are dependent on trace minerals and ever more fertilizers are pumped into diminishing land. Because Nitrates are dependent on mined gas which will last at very best 40 or 50 more years but more likely less than that then their availability and cost will be greatly impacted. Rock phosphate is mined in other parts of the world some at present hostile or unfriendly towards other regions of the world so there is no guarantee of availability in situations of conflict. Additionally some countries such as Morocco are believed to be exaggerating their resource. Estimates of Rock Phosphate range from a few hundred years to less than 60 years but again recycling of nutrients is very important in any future vision.

Pesticides for food crops are destroying biodiversity and having an impact on soil fertility with many of the bacterial and fungal micro-organisms within the soil destroyed from pesticide use. Bee populations are of grave concern. A famous quote from that Albert Einstein said that if all the bees died humans would have about 4 years to live. Pollinating insects are responsible for a huge amount of the world's food.

While Ireland has some land and climatic advantages for animal based agriculture, the sector as a whole across

the planet is an incredibly inefficient use of land. Every calorie of beef for example consumes 10 to 20 calories in external food inputs; much of this is cereal crops which could be eaten directly by humans. It is also an inefficient use of other resources such as water. That is another reason for encouraging and incentivising farmers into less resource intensive plant rather than animal production which frees up some of the land for other valuable purposes.

## Jobs

Many of the new jobs will be in the food and energy sectors and a substantial number of these could be based in rural or semi-rural locations. The current talk is of boosting the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> Cities but these assume many of the same jobs we have today. Failing to plan for the problems outlined in the introduction above would lead to jobs market collapse. If we do plan for these problems then food growing assumes much greater importance. We can expect a move away from meat and dairy and into more plant based sectors. We can expect the cost of food to increase as a percentage of income because of current sustainability constraints and for smarter and safer ways of growing food come to the fore.

Assumptions are for an ever greater reliance on technology. As an automation engineer I can confirm that automation actually removes jobs and much manufacturing work can be automated.

We will always need food, water and shelter so these sectors will need to be a mainstay of the economy. The energy sector is another where employment can be targeted, most of whose production will occur in rural areas, though jobs will be relevant in the larger populations centres. A big challenge is foreseeing what urban jobs will be. Certainly there is the existing Medical Devices Sector which can continue to be a relevant area provided the global economy provides a market.

On Exports, Ireland was warned back in the 1990's that we were too reliant of FDI with not enough indigenous industries. In the meantime our reliance on FDI has increased to the detriment of national innovation. Ireland can lead the way in Energy Engineering and in bio refining and bioengineering some of which can be exported. We are at the forefront of wave energy innovation but it will be probably 8 or more years before this innovation bears fruit. Nevertheless we can look at the engineering and expertise export potential. More importantly we can look at completely new forms of energy innovation from hybrid renewable energy systems to energy storage. We can also grow far more food crops and change the support structure within the EU if necessary so that every Country has the potential to have diversity in its food production. Greater diversity will ensure we will not be over dependent as presently on (most eggs in 2 baskets) beef and dairy.

Also in the energy area, many jobs can be created especially in urban areas from using district heating and electricity systems and using the Smart Grid. While we should have the Smart Grid within a few years there could be a link made to innovators so as to utilise the technology to maximum benefit. Start up companies could be encouraged in this sector by brain storming events.

In order to meet Paris Climate agreements the Irish Government plans a lot more tree growing but more than likely this is monoculture Sitka spruce and the likes whereas we could merge this tree growth with the food economy and grow far more fruit and nut trees. Also we should prefer diverse native woodland to monoculture which (also can use toxic pesticides). Biomass growing advice in the past also had an emphasis on pesticide use in the first year or 2 of growth. The future of the sector can incorporate community co operatives and offer Government and / or EU supports for all food considered to have been grown sustainably. All of the above has the potential to create jobs and the greater the diversity of types of plant growing, the more jobs created.

## Ageing Population

Ireland's population is likely to grow and there is little doubt that an ever growing proportion of it will be over the age of 65. Talk of extending the retirement age is based on assumptions that humans will live ever longer from scientific advances and greater knowledge. That assumption also depends on a good economy so that people can pay for health services. It is possible that retired people could work a range of hours 10, 20 or 30 with their pensions augmented accordingly. We will most likely also need an influx of immigrants to work to keep the lesser working population fed and sheltered.

The current health service needs a much larger budget (most likely paid for by income tax). A lot of the money invested will be paid back from people getting treated more quickly. Additionally we should be investing far more in up front diagnosis much like a car getting an NCT Test.

We are losing a lot of money from training doctors and nurses who then leave the Country. Health service experts

say that we are not planning at all for Ireland's increasing population. People's health and lifestyle varies at all ages and more flexible working hours should be promoted. For example parents in the thirties and early forties should be given a variety of working hour options.

One of the constraints is bed numbers which are very low compared to many other countries who see themselves as modern.

### Homelessness

This like other problems such as health can't be solved without investment. To avoid political taking advantage, a cross party policy needs to be adapted so that money spent isn't used as a political football later on when other budgetary resources suffer.

Ireland needs to decide what our value systems are in relation to socially disadvantaged and people with disability. If we want to provide them with services then we need to pay for it out of the budget and general taxation seems the fairest way to do this.

### Rental Sector

We need to ensure people aren't prevented from adding to the economy (or worse forced into hardship because of lack of rent controls). Higher rents should be applied to high standards and low rents to lower standards. Additionally large numbers of student accommodation could relieve the pressure on non-students seeking rental accommodation in the College towns and cities. Scarcity is putting landlords in an advantageous situation and this imbalance is bad for society.

A spatial strategy which brings people into more rural settings and the regional towns through employment in the sustainability sector will also help ease pressure on urban large city rents. To make rural areas more attractive, a greater investment in the culture and gastronomy sectors is also required.

### Housing

The cost of housing needs to be kept at a manageable level by ensuring that there is sufficient supply. Additionally the embodied energy of buildings needs addressing as concrete for example has a massive CO2 footprint. Homes built using eco materials should be encouraged. Where data does not exist for energy efficiency of certain types of eco home, validated engineering experiments can be set up. This methodology could be added to Part L of the Building Regulations so that eco homes with less common materials are accepted (so long as the building in an overall sense meets the energy standards).

There is a lack of sustainability focus on human sewage treatment. Reed beds and compost toilets should be promoted more than they are. While people may be able to get planning based on reed beds in some regions, as far as I'm aware no planning authority currently allows compost toilets in isolation. Scientific tests and standards may determine what types of toilet are allowable. Additionally we are allowing a vast array of toxic products into our water and trying to treat these afterwards and recycle the water. This area requires responsible Government which ignores of any vested interests within the household detergents and sanity products sector. This was done fairly successfully for tobacco so the same standards and methods could be used to protect the natural environment. We currently have all our water treated to so called drinking standard when people are drinking only a fraction of it. We also need to remove Chlorine and Fluoride from our water so as not to be giving people chronic health problems. Chlorine for example is believed to affect our gut flora which is so important in digestion. It had its place in eradicating serious illnesses in days gone by but should be removed before drinking. Some parts of the world remove the Chlorine before the water reaches the tap. Some water systems in Ireland have dual treatment of Chlorine and Ultraviolet so the idea of the need for both should be questioned.

Likewise Fluoride which is stressing an ever larger number of people. The simple solution to dental healthcare is public education initiatives using RTE initially while it's still relevant and other media as its relevance becomes diluted beyond the point of effectiveness. Force feeding the entire population on a chemical is like using a sledgehammer to crack a nut.

Solid waste tends to be a one way pipe system which ends up out at sea. We need those nutrients (as NPK fertilisers become more scarce and expensive) and as land fertility is diminished. The goal should be to collect contamination free human waste, extract biogas resource and use the solid waste residue which has been safely processed to fertilise the land. We will see that waste as extremely valuable in a few decades and should start

