BEFORE THE OTAGO REGIONAL COUNCIL
AT DUNEDIN

Under the	Resource Management Act 1991
In the Matter of	Proposed Otago Regional Council s Draft Regional Polic Statement

STATEMENT OF EVIDENCE OF NATHAN R SURENDRAN TO ACCOMPANY
SUBMISSIONS BY THE WISE RESPONSE SOCIETY INC.

of the models to linear projections. The historic reasons for these simplifications ere related to computational capabilities, and hilst these no longer hold, the methodologies remain.

11. This is evident hen thinking about energ suppl , in that the current models use an energ industr standard technique kno n as demand led forecasting , hich is a methodolog that as developed in the last centur . Its underl ing assumption is a basicall infinite suppl of economicall recoverable fuel, and that the onl barriers to e traction of that fuel are suppl and demand d namics in the global econom .

12. This methodolog , e ternalises the bioph sical constraints of a full planet here e have transgressed planetar boundaries (Steffan et al, 2015) from its thinking.

13. From the research report for the UK s professional insurance risk bod , the Institute and Facult of Actuaries (Jones, 2013), Resource constraints: sharing a finite orld. The evidence and scenarios for the future :

    This report has brought together the latest evidence on resource availability and constraints and explored how these may impact on the economy and finance. The key finding is that the future will be very different from the past. ***Resource constraints will, at best, steadily increase energy and commodity prices over the next century*** *and, at worse, trigger a long term decline in the global economy and civil unrest. The actuarial profession should recognise that resource constraints do raise the possibility of a limit to growth over the medium term and should therefore dedicate some research effort into understanding how this may impact their advice.*

    The ***evidence for resource constraints is compelling*** *and, perhaps surprisingly, the* ***global economy remains relatively blind to this issue.*** *Particular resources will have local impacts (such as water) while others will have global impacts (such as oil). The 1972 Limits to Growth study highlighted that following a 'business as usual' path ended in global economic and societal collapse by the middle of the 21st century. This is the path that economic development has continued to follow for the past 40 years.*

    How resource constraints impact the economy is complex, uncertain and depends on a number of factors. Political and market responses to the challenges faced by resource constraints will have far reaching consequences which ***need to be better understood and better modelled by decision makers and their advisors****. To a large extent the impacts can be managed, or at the very least influenced.*

    Does the current 'no growth' economy in developed countries give us enough time to innovate or does it distract us from our real

challenge? Will the increasing cost of resources result in investments into new methods of doing things or merely increase our investments into business as usual? Will any individual, organisation or sector take responsibility for managing a transition to a new economic paradigm or will society force this responsibility onto them in time (or too late)? ***Modelling such a high impact set of issues is critical not just for actuaries but also for society as a whole.***

14. It is becoming increasingl evident, even to mainstream economic thinkers, that something is seriousl rong. The Reserve Bank of Ne Zealand reports (RBNZ, 2015) that increasing risk e ists in economic s stems.

15. The reason for this increasing risk as apparent all along ith the correct limits based thinking (Tverberg, 2012) but has remained unidentified to central banking institutions, even as the s mptoms have become apparent.

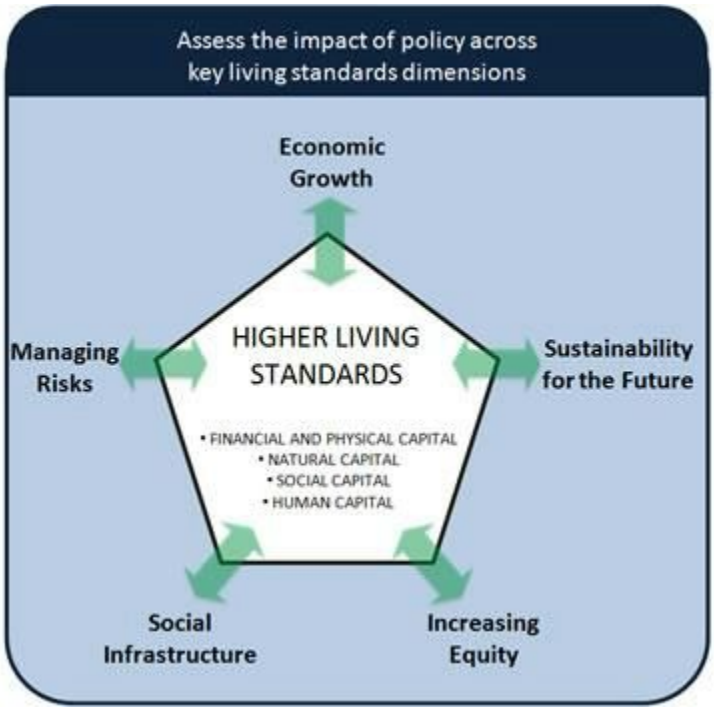
16. The consequences of these limits have been masked b 7+ ears of e traordinar monetar polic , a situation that cannot continue indefinitel .

17. The signs that the fiscal consensus amongst central banks that sustains this strateg , is increasingl strained at the global level are evident in the recent devaluation of currencies globall in an attempt to keep e ports competitive.

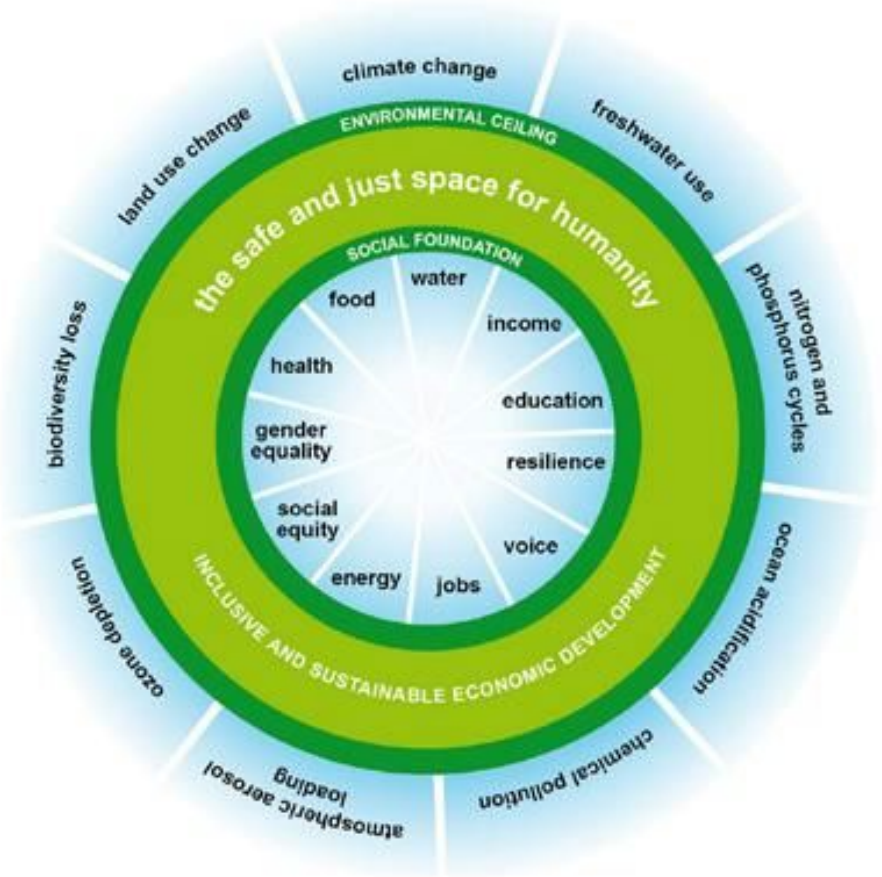
18. The visualisation of the orthodo neo-classical economic thinking from the Higher Living Standards Frame ork (HLSF) regarding risk management stands in stark contrast to the visualisation in the pla full serious doughnut economics frame ork from heterodo economist Kate Ra orth.

Both are presented belo for comparison:

19. Higher Living Standards frame ork (NZ Treasur , 2014):



20. The safe and just operating space for humanit visualised as the pla full serious Doughnut Economics (Ra orth, 2012):



21. Note that the HLSF visualisation fails entirel to place the econom ithin the bioph sical and moral constraints imposed b ecos stems and social justice. It also fails to present the compelling case for sufficienc , rather than gro th, as the source of ell-being in the face of the diminishing returns evident in the points I have made.

Implications for infrastructure and the built environment:

22. Planning to ards the future outlined implies some interesting considerations:
    - *"All forms of economic production and exchange involve the use of energy directly and in the transformation of materials. Until recently, cheap and seemingly limitless fossil energy has allowed most of society to ignore the importance of contributions to the economic process from the biophysical world as well as the potential limits to growth. This paper centers on assessing the energy costs of modern day society and its relation to GDP. Our most important focus is the characteristics of our major energy sources including each fuel's Energy Return On Investment (EROI). The EROI of our most important fuels is declining and most renewable and non conventional energy alternatives have substantially lower EROI values than traditional conventional fossil fuels. At the societal level, declining EROI means that an increasing proportion of energy output and economic activity must be diverted to attaining the energy needed to run an economy, leaving less discretionary funds available for "non-essential" purchases which often drive growth. The declining EROI of traditional fossil fuel energy sources and the effect of that on the world economy are likely to result in a myriad of consequences, most of which will not be perceived as good." (Hall, et al, 2014)*

23. For the built environment, this probable future implies, for e ample, that high tech, high comple it solutions (including devices such as heat pumps, for e ample), ill not be as idel available, or as cheap, as the are no . Maintaining such devices could be problematic due to availabilit of spare parts. Passive design and reduction in demand for energ using for e ample lo flo ater fittings, ill be good resilience upgrades. Another e ample is rain ater collection as a secondar ater suppl versus a secondar suppl into to n main infrastructure. This particular e ample has precedent in the conclusions of other TA s around the countr .

24. For our transport s stems, this probable future implies, for e ample, that non-essential personal transportation using petroleum and diesel po ered vehicles ill be scrutinised much more closel . Rationing and shortages are inevitable, and sustaining road infrastructure ill become far more demanding economicall , and ill over time become uneconomic on the scale currentl realised. Alternatives such as rail

could be of great assistance for bulk transportation of goods and people. Just in time deliveries ill be interrupted at times, leading to shortages of certain goods such as, for e ample, food to the supermarkets.

25. Looking back to the oil crisis of the 1970 s gives some idea of potential polic responses, ho ever:

26. For both of the above considerations, the situation ill need to be considered as permanent, and the objective of polic should be to ste ard isel the diminishing suppl , to assist the ine orable transition a a from the diminishing fossil fuel reserves e have.

27. You ill note that I have made no mention of other commonl understood drivers of change that ill push us in the same direction, such as climate change and ecos stem impacts. These are essential considerations, ho ever m reading of the situation is that the short to medium term drivers are likel to be energ and economics.

28. There has alread been significant anal sis commissioned b and addressed to territorial and regional authorities on this issue, such as:

    Dunedin City Council regarding vulnerability to changes in fuel supply, climate change, and economics: Peak Oil Vulnerability Report (http://bit.ly/1A9q5w4), plus appendices (http://bit.ly/1A9q7El) which should also be considered as evidence, from within the Otago local government documentation, of similar concerns that have been identified.

    Otago Regional Council in the context of Land Transport: "Pressures and Risks facing land transport in Otago"; 2011 : Pg 127 Draft Otago Southland Regional Land Transport Plans 2015-2021 (http://bit.ly/1EtWPH1)

In Conclusion:

29. Even if the Otago Regional Council does attend pro-activel in their transportation and energ polic response to the actual risks to societ that science, professional bodies, and the actuarial communit globall have described, then Otago's e isting socio-economic s stems are likel to come under severe stress.

30. The geological constraints on energ e ploitation and particularl oil, are leading inevitabl to a net contraction in energ suppl , particularl liquid fuels for transport. Within the life span of this iteration of the Regional Polic Statement this ill probabl have a material impact.

31. If the Otago Regional Council does not attend pro-activel , the region ill be left facing unnecessar difficult in making the transitional changes

a a from declining resource availabilit , particularl oil, that evidence suggests e face in the short to medium term.

32. Central government are currentl unable to undertake the task of understanding the interconnected risk environment. This appears to be due to generall unrecognised dra backs to the neo-classical economic models as discussed. As such, it is b default devolved to regional and territorial authorities to understand for themselves, and manage the consequences.

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