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Mōhio would like to take this opportunity to congratulate the Productivity Commission on the breadth and detail of its *Low-emissions Economy* draft report, and particularly for its inclusion of oft-neglected areas such as governance, finance, and transitions. Below are some additional remarks that the Productivity Commission might consider as supplements to its draft report.

§4.8: Complementary measures to emissions pricing

Mōhio proposes the addition of a further complementary measure: *adaptive management of emissions pricing*.

Adaptive management of emissions pricing

Given the uncertainty and unpredictability of systems interventions such as an emissions price, it is prudent to design and implement a system for adaptive management. This function should fall most naturally under the remit of the Independent Climate Commission.

Adaptive management has been defined as: "flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process."[1]

An alternative definition: "Adaptive management is an approach to natural resource management that emphasizes learning through management based on the philosophy that knowledge is incomplete and much of what we think we know is actually wrong, but despite uncertainty managers and policy makers must act."[2]

In the case of emissions pricing, an adaptive management approach is vital, especially if emissions prices are projected to reach levels of $75-200 per tonne, because this entails a

[1] National Research Council (2004) *Adaptive Management for Water Resources Planning*. Washington DC, USA: The National Academic Press.

[2] Craig R. Allen, Joseph J. Fontaine, Kevin L. Pope, and Ahjond S. Garmestani (2011) "Adaptive Management for a turbulent future", *Journal of Environmental Management* 92 (2011), pp. 1339–1345.

significant intervention into the economic and political systems of New Zealand, with all the uncertainties that this entails. These systems are highly complex and adaptive, so emissions pricing will have unpredictable consequences, which could impact in unexpected ways. Accordingly, the implementation of an effective monitoring and evaluation system is vital: "Monitoring allows for management to set new target levels, and modify policy to reach those target levels, as new information is generated on scale-specific system attributes."[3]

It is worth noting that unexpected consequences may often be climate-aligned. Indeed, this is one of the virtues of implementing a systems-scale intervention such as an emissions price, because it can induce positive change in areas that planners could not have anticipated or prepared for. However, perverse consequences are also possible, especially given the intricacies of how emissions are (or are not) accounted for. These negative impacts are also likely to be reflexive – that is, to create feedback loops of cause and effect – especially because perceptions of "failure" by the emissions price will undermine its social license and political legitimacy.

- One example is the impact of "grand-fathering", where the setting of a baseline can reduce the need to reduce emissions for sectors that were emitting at high-levels at the time of that baseline.

- Another example is the challenge of Emissions Intensive Trade Exposed (EITE) exports, where a high emissions price could displace emitting activities offshore where efficiencies are lower and hence emissions higher, and thereby lead to higher overall global emissions.

- One final example is the relationship between emissions pricing and land price. Theoretically, the creation of a new economic opportunity – such as the opportunity to derive income from carbon sequestration from forest planting – will be capitalised into the price of land. That is, productive value of carbon farming will influence speculative value of land.[4] Given that land price is the single largest factor for would-be forest growers, an increase in land price also raises the threshold by which afforestation is likely to be financially viable. Hence, there is, in theory, a risk that rising emissions prices will contribute to the infeasibility of afforestation.[5] Potentially this effect is less relevant for marginal land. Potentially this effect is also insubstantial while emissions prices are relatively low. But there is substantial uncertainty over what effect this will have when emissions prices are significantly higher, or indeed if there is a speculative effect because emissions prices are *projected* or *mandated* to rise significantly in future.

These latter issues should be regarded as provisional, partly because of the inherent uncertainty involved, but also because New Zealand is not well-served by empirical research into these effects. It is therefore necessary for the proposed Climate Commission to monitor

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[3] Craig R. Allen, Joseph J. Fontaine, Kevin L. Pope, and Ahjond S. Garmestani (2011) "Adaptive management for a turbulent future", *Journal of Environmental Management* 92 (2011), p. 1342.
[4] Phil Journeaux (2015) "The Effect of Environmental Constraints on Land Prices", Report, AgFirst Waikato Ltd.
[5] See the submissions to the *Low-emissions Economy* report by the New Zealand Institute of Forestry and the Forestry Leadership Group.

and evaluate these adaptive dynamics – or, conversely, to falsify these dynamics as non-existent or irrelevant – so that decisions can be made.

§6.5: Key investment opportunities

Green Investment Fund

On p.145, the *Low-emissions Economy* draft report quotes from Mōhio's *Climate Finance Landscape* report (Hall & Lindsay, 2018) where we discuss the "judgement required as to whether a green investment bank is appropriate", particularly in regards to "whether the transformation of existing institutions is a preferable outcome". The *Low-emissions Economy* draft report notes that 'it is unclear what the authors mean by transformation of existing institutions, or how such a transformation could occur' (p.146).

We welcome the opportunity to clarify and elaborate on these remarks. To some extent, these remarks are less relevant than they were, given that preliminary work to develop the Green Investment Fund (GIF) is already underway. However, this clarification will shed further light on the potential role and purpose of the GIF.

The political judgment we referred to on p.145 was the choice between (1) the expenditure of time and capital on establishing a new entity – a Green Investment Fund – to mobilise green investment; or (2) the expenditure of time and capital on rehabilitating or retrofitting existing entities – MBIE, MPI, EECA, NZVIF, Callaghan Innovation and others – to advance the same aim.

We recognise that this is not an either/or choice, that options (1) and (2) are not mutually exclusive and could be pursued together. However, there are trade-offs, because there are constraints on the time, capital and operational capacity that is available for institutional design and redesign. Moreover, there are potential overlaps in the likely mandate of the GIF and the mandates of those existing entities, which would need to be rationalised in order to avoid conflicting mandates. Hence the need for political judgment.

Option (2) would have focused capacity on upgrading or expanding existing entities that are, or could be, involved in climate finance, particularly MBIE, MPI, EECA, NZVIF, and Callaghan Innovation. The purpose of such reforms would have been to better align their organisational purpose to climate-aligned investment, or to address existing barriers to such outcomes when climate-aligned investment is already within the organisation's mandate. As to how such transformation could be achieved, the incorporation of priorities or requirements around climate alignment (or at least the negative screening of climate-misaligned investments) is an obvious first step. There is also a growing literature on organisational reform for sustainability that highlights issues such as vertical integration of a sustainability philosophy, engagement of leadership, and integration of social and environmental impact into organisational

accounting, reporting and monitoring.[6] However, such reform would faces obstacles that are familiar within organisational theory, which include leadership disengagement, lack of sustainability knowledge, internal diversity and disagreement, bridging gaps between theory and practice, overcoming path-dependencies, and so on.

In light of these obstacles, Option (1) has its virtues. As we discuss in the *Climate Finance Landscape* report, "it could plausibly be faster and easier to establish a new institution with a climate-aligned mandate than to achieve internal reform across multiple existing institutions."[7] Indeed, this systems change is increasingly identified as a major benefit of green banks. A report by the Green Bank Network describes the capacity for "market transformation" which it defines as "the process by which the activities of green banks facilitate transactions in which the green bank is not directly involved by pushing enduring and widespread market changes... [It] implies widespread and permanent change toward a common envisioned future, and for green banks, that future is one in which LCR [low-carbon climate resilient] infrastructure is financed increasingly with private capital as new asset classes are created and enter the investing mainstream."[8]

To put it differently, there are two ways to think about the purpose of a green investment fund. Firstly, *as an end-in-itself*, as an instrument with a mandate to deploy its funds for climate-aligned projects that might otherwise not have mobilised finance. Secondly, *as a means to an end*, as a catalyst of transformation to a low-emissions economy which leads by example, which drives innovation, which de-risks investment into public value, and which consolidates expertise and insight. It is the prospect of this broader, deeper systems change which underlies the true value of the Green Investment Fund, but this potential could easily be neglected if it was regarded and evaluated more narrowly as an investment vehicle.

To be clear, the Green Investment Fund should be judged on its capacity to advance a number of roles which include:[9]

- *Capital mobiliser:* to mobilise public and private funding through blended finance and the issuance of bonds;
- *Capital provider:* to be a source of climate finance for low-emissions infrastructure that supports climate mitigation and adaptation;
- *Lead arranger:* to build an investment pipeline and structure deals involving stakeholders and potential investors;
- *Innovator:* to pilot or demonstrate new tools, instruments or outcomes in a local context;

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[6] Carla Millar, Patricia Hind, and Slawek Magala (2012) "Special Issue: Sustainability and the Need for Change: Organisational Change and Transformational Vision", *Journal of Organizational Change Management* 25(4). Deborah E. de Lange, Timo Busch, and Javier Delgado-Ceballos, eds. (2012) "Special issue on Sustaining Sustainability in Organizations", *Journal of Business Ethics*, 110(2).
[7] David Hall and Sam Lindsay (2017), *Climate Finance Landscape for Aotearoa New Zealand: A Preliminary Survey*, Report Prepared for the Ministry for the Environment, Auckland: Mōhio, p.60.
[8] Bettina Bergöö and Doug Sims (2018) "How Green Banks Assess and Report Impacts", Green Bank Network Issue Brief, Green Bank Network and Natural Resources Defense Council.
[9] Angela Whitney and Paul Bodnar (2018) "Beyond Direct Access: How National Green Banks Can Build Country Ownership of Climate Finance", Insight Brief, Boulder CO: Rocky Mountain Institute.

- *Capacity-builder:* to build capacity of local banks, investors and other organisations to understand and manage low-emissions investments, through engagement and training of professionals;
- *Enabling environment accelerator:* to provide immediate and trusted feedback to Government about how to improve the enabling environment for climate-aligned investment, especially through regulatory adjustments and policy reforms.

§4.8: An independent climate change institution

What issues should fall within the Climate Commission's remit?

As discussed above, it is Mōhio's view that adaptive management ought to be an explicit function within the remit of the proposed Climate Commission. To some extent, this relates to the proposed function: to "undertake and publish research about the opportunities, costs and risks relating to New Zealand's transition to a low-emissions economy" (p.187). However, the role of adaptive management ought to be more explicit and distinctive.

Adaptive management requires real-time monitoring and evaluation of the actual effects of emissions pricing and other policy interventions, then a framework of responsive decision-making that can amend or modify the regulatory system in order to mitigate adverse effects and maximise negative effects.

As such, adaptive management plays a distinctive role from policy approaches that aim to predict the consequences of emissions pricing through "opportunities, costs and risks". Adaptive management recognises that prediction is challenging, that uncertainties are irreducible, and that decision-making needs to be curious and flexible enough to identify and manage contingencies. However, adaptive management should be regarded as complementary to, not substitutive for, anticipatory policy-making. The two approaches can, and ought to, operate together.

Chapters 7 & 9: Laws, institutions and an inclusive transition

In thinking about issues of governance, a useful framework for evaluating policy design *a priori* is the Earth Systems Governance (ESG) framework.[10] It offers five analytical problems (architecture, agency, accountability, adaptiveness and allocation/access) and four cross-cutting themes (power, knowledge, norms, and scale) by which to analyse the governance and politics of sustainability and especially environmental transformations (see the figure below from Patterson et al. 2017). The ESG framework is widely peer-reviewed and is utilised by the largest global network of social scientists working in environmental governance.[11]

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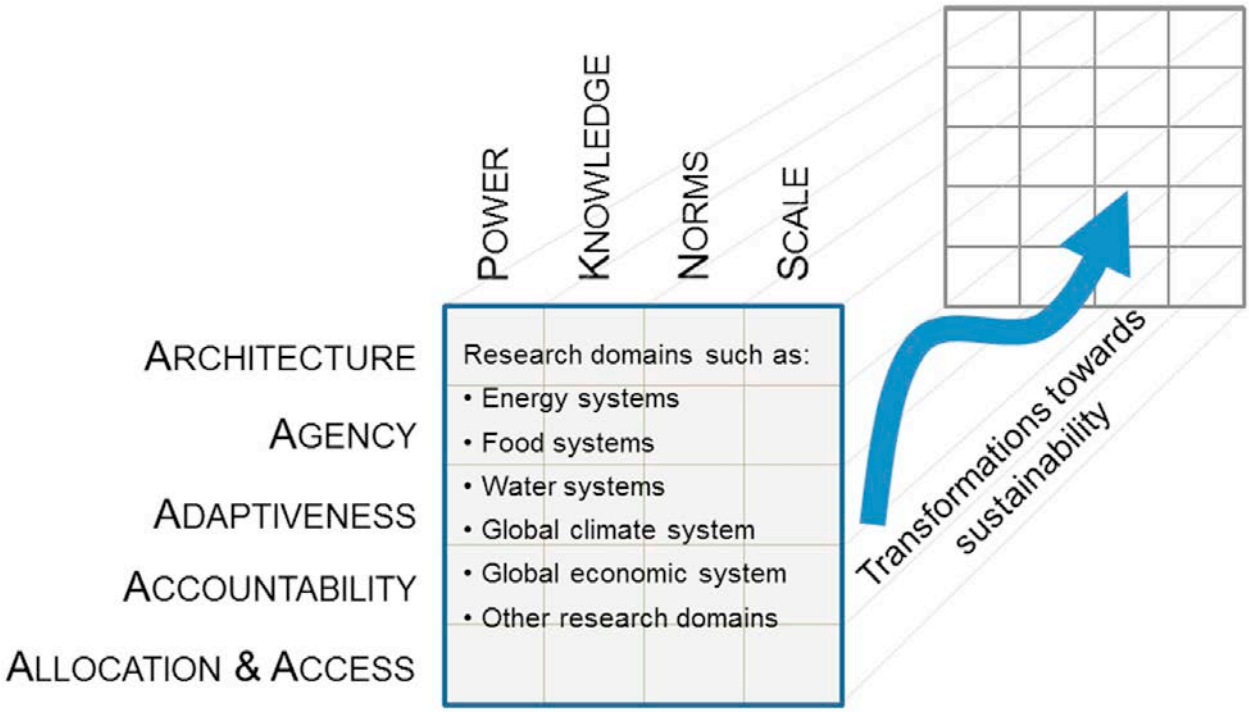
[10] F. Biermann, M.M. Betsill, J. Gupta, N. Kanie, L. Lebel, D. Liverman, H. Schroeder, B. Siebenhüner, R. Zondervan (2010) "Earth system governance: a research framework." *Int. Environ. Agreem.* 10: 277-298.

[11] James Patterson, Karsten Schulz, Joost Vervoort, Sandravan der Hel, Oscar Widerberg, Carolina Adler, Margot Hurlbert, Karen Anderton, Mahendra Sethi, Aliyu Barau (2017) "Exploring the



The five analytical problems are:

- ***Architecture:*** issues relating to the emergence, design and effectiveness of governance systems as well as the overall integration of global, regional, national and local governance.
- ***Agency:*** issues relating to how agents engage in environmental governance, especially the influence, roles and responsibilities of actors apart from national governments, such as business and non-profit organizations, the ways in which authority is granted to these agents, and how it is exercised.
- ***Accountability:*** issues relating to accountability, transparency and legitimacy for environmental governance, especially the institutional designs that can provide a democratic quality to earth system governance by guaranteeing balances of interests and perspectives.
- ***Adaptiveness:*** issues relating to managing the inherent uncertainties of human and natural systems, in a way that combines stability to ensure long-term governance solutions with flexibility to react quickly to new findings and developments.
- ***Allocation & access:*** issues relating to the distribution of material and immaterial values; in particular, how to manage conflicts over access and allocation of goods in a way that is responsive to norms of justice, fairness, and equity.

The first three cross-cutting themes relate to the way that power, knowledge and norms (or the absence of power, knowledge and norms) influence the way that these analytical issues manifest. The scale theme highlights that these issues operate at a range of scales which are,

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governance and politics of transformations towards sustainability." *Environmental Innovation and Societal Transitions* 24: 1-16.

to an extent, inter-related. Finally, the temporal dimension, “transformations toward sustainability”, provides the ESG framework with its relationship to time, insofar as environmental governance is is not static, but evolves and adapts in response to crises and opportunity.

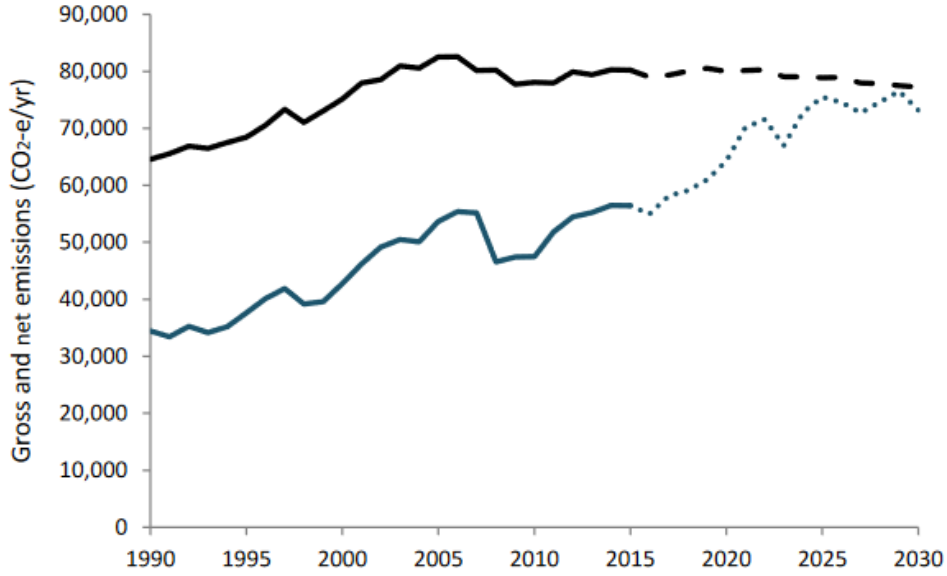
Mōhio regards the ESG framework as a useful heuristic for evaluating New Zealand’s emerging governance regime for transitioning to a low-emissions economy. In many regards, the proposed climate governance regime that is emerging through the Zero Carbon Bill and the Productivity Commission inquiry are well-aligned with this framework. This is not an appropriate venue for a comprehensive ESG analysis – this is more appropriate for a submission on the Zero Carbon Bill specifically – but the Productivity Commission is invited to consider these themes and problems as it completes its inquiry into the low-emissions economy.

§10.5: Putting a price on all land emissions

New Zealand’s plantation forests are primarily managed as clear-cut systems. New Zealand has also been prone to irregular rates of forest planting, with high planting rates in the early-mid 1990s, then low rates in recent years. This has implications for national net emissions, as evidenced by the graph below.[12] As forests planted in the 1990s reach maturity, they are likely to be harvested (although a glut in supply could entail a decline in market price, thus reduced harvesting, so there are uncertainties on this point). If the forests are indeed harvested, then that reduces the volume of carbon removals. As such, the LULCF sector goes from being a substantial carbon sink, offsetting nearly one-third of gross emissions, to offsetting almost none. Hence, New Zealand’s net emissions are projected to increase significantly up until 2030, even if New Zealand’s gross emissions succeed in plateauing and declining (see the graph below from MfE 2017).

[12] Ministry for the Environment (2017) *New Zealand’s Third Biennial Report Under the United National Framework Convention on Climate Change*, Wellington: New Zealand Government, p.44.

Figure 4.1: New Zealand's historical (solid lines) and projected (dotted lines) gross and net emissions from 1990–2030 under the UNFCCC (referred to as the 'with measures scenario')



Note: CO_2-e/yr = carbon dioxide equivalent per year. The black lines represent gross emissions, while the blue lines represent net emissions.

The One Billion Trees Programme, which aspires to reaching planting rates equivalent to the early-mid 1990s, could offset this forest loss from harvesting throughout the 2020s. However, if these "billion trees" were planted under clear-fell systems, then this could create yet another bulge in harvestable wood that would begin in the late 2040s, and so another bulge in net emissions when New Zealand is aspiring to reach its 2050 target.

One way to smooth out these bulges is to increase the adoption of continuous cover forestry (CCF) systems. This is where forests are harvested incrementally through selection systems, by removing individual trees or small blocks, but retaining permanent forest cover. This has a range of environmental co-benefits, because there is no point at which the trees are all removed, exposing the land to the elements. As such, the erosion, sediment loss, and disruption of biodiversity that is associated with clear-fell forestry is avoided. From the perspective of climate adaptation and land resilience, these are principal virtues.

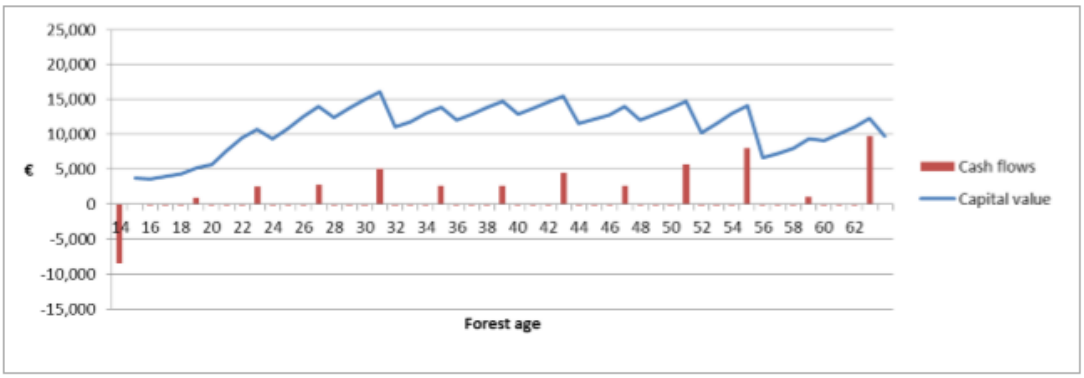
More relevantly for this submission, however, CCF does not have the "saw tooth" pattern of clear-cut systems where carbon is accumulated then lost over the course of the nearly-thirty year rotation cycle. CCF therefore overcomes the problem identified above, even if planting occurs episodically in boons, because the carbon is sequestered as a *carbon stock*, rather than temporarily removed from the atmosphere as a *carbon flow*.

This is potentially a financially viable system: a recent investment analysis by asset manager SLM Partners estimated an internal rate of return of about 6% before inflation, by modelling a Sitka spruce-dominated plantation in Ireland.[13] This investment analysis informed the

[13] Paul McMahon, Darius Sarshar, and Paddy Purser (2016). "Investing in Continuous Cover Forestry", White Paper for SLM Partners.

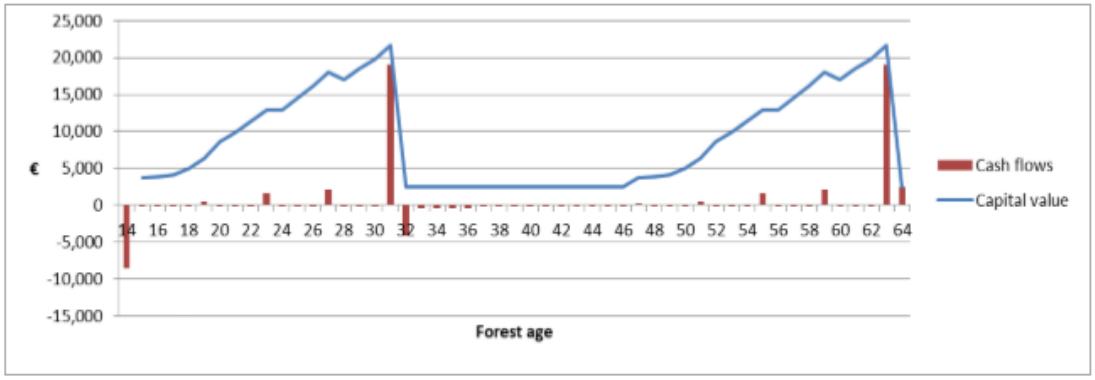
European Investment Bank's €12.5 million (NZ$20.8 million) investment into "continuous cover forestry" projects in Ireland through its Natural Capital Finance Facility. Notably, the added resilience and increased social license of CCF makes it, in some ways, a more attractive proposition for investors. Also, the expected cash flows – like the projected carbon removals – are more regular for CCF, avoiding the "saw tooth" pattern of clear cut forestry (see the charts below from McMahon 2016).

CCF real returns per hectare



Note: Based on methodology for modelling CCF set out in O. Davies & G. Kerr (2011) adapted to Irish conditions. 3 cohorts are assumed to coexist after regeneration and each cohort is modelled separately. Earlier cohorts are gradually felled to 'release' later cohorts. This is a simplified representation of a continuous cover forest – cash flows will be more even in reality. Shows real returns, before inflation – nominal returns will be higher. Includes forest management and insurance costs.

Clearfell real returns per hectare



Note: Modelled using GROWFOR. Real returns, before inflation – nominal returns will be higher. Includes forest management costs. Capital value = value of standing timber + underlying land.

The New Zealand Farm Forestry Association recently received a Sustainable Farming Fund grant to explore the feasibility of continuous cover forestry for small forest blocks in New Zealand, drawing upon the system trialled by Dr John Wardle in Oxford, North Canterbury. However, even if CCF is not deemed financially viable by landowners, or not profitable enough, the Government could look at direct or indirect ways to make CCF viable, in light of its additional public benefits, such as imposing pollution charges on damage caused by alternative forest systems, or providing payments-for-ecosystem-services to reward the

additional public value of CCF, or de-risking investment into CCF with tailored forest finance instruments.[14]

§15.2: Emissions through the life-cycle of a building

The split-incentive problem

In various places (e.g. pp.106–107; 230; 390–391) the *split-incentive problem* is identified as a barrier to improvements in energy efficiency. This is where the costs and benefits of energy efficiency are split between the owner and tenant of a building, because of the separation of responsibilities for capital improvements and paying energy bills. So, while the owner would carry the cost of energy efficiency upgrades, the tenant would accrue the benefits; thus, the owner has no incentive to upgrade and the tenant is left to bear the costs of prolonged inefficiency. (Alternatively, buildings with a full-service lease structure face the opposite problem, where owners have an incentive to reduce energy costs, but tenants are not penalised for wasteful energy use.)

There are ways to overcome split-incentive problems. The *Low-emissions Economy* report mentions the enforcement of minimum standards, for which owners must bear the cost of compliance. However, precisely because of this burden upon owners, there is a political and practical limit to how far these

The transition to 'green leases' (also known as 'energy-aligned', 'energy efficient' or 'high performance' leasing) where the tenant is contractually obliged to transfer some proportion of the energy efficiency gains to the owner, under the condition that the upgrades create the promised efficiencies.[15] This need not involve a substitution of leases, but simply a 'rehabilitation' of existing leases through the inclusion of certain clauses that better align financial incentives to sustainability outcomes. These clauses include:

- ***Cost-recovery clauses:*** where the owner shares with tenants the costs of energy efficiency upgrades. This includes *amortisation*, where capital expenses are spread out over a period of time; or a *savings pass-through* where operational savings are recouped until the building owner has been repaid for their original capital expenditure.
- ***Energy-efficient tenant build-out:*** where the owner requires tenants to meet certain sustainability standards or green certifications in any build-out or fit-out that the tenant

[14] Food and Agriculture Organization of the United Nations (FAO) & Global Mechanism of the UNCCD. (2015). *Sustainable financing for forest and landscape restoration: Opportunities, challenges and the way forward.* Discussion Paper. Rome: FAO & Global Mechanism-UNCCD.
[15] Andrew Feierman (2015) "Measuring the Potential Impact of Green Leases in the U.S. Office Sector." Report. Institute for Market Transformation. Retrieved from https://www.imt.org/wp-content/uploads/2018/02/Green_Lease_Impact_Potential.pdf; BOMA International and Rocky Mountain Institute (2012) "Working Together for Sustainability: The RMI-BOMA Guide for Landlords and Tenants". Report. RMI & BOMA.

undertakes. This can be operationalised by limiting the allowable lighting load, plug load, or requiring E3 or ENERGY STAR-rated appliances.

- ***Sub-metering:*** where submeters are installed in multi-tenant buildings, so that tenants are billed by (or at least made aware of) their actual energy use.
- ***Building commissioning:*** where core building systems and operational features are systematically assessed on their functioning, with the costs and benefits of evaluation, commissioning, retrocommissioning or recommissioning being shared between owner and tenant through an agreed-upon schedule.

For resources and tools on green leases, see below:

Green Lease Library	http://www.greenleaselibrary.com/green-lease-leaders.html
Rocky Mountain Institute: Built Environment: Tools and Resources	http://www.rmi.org/tools_and_resources
GSA: Green Lease Policies and Procedures	http://www.gsa.gov/portal/category/108551
Northwest Energy Efficiency Alliance: Solving the Energy Efficiency Puzzle: Achieving Bigger Savings in the Pacific Northwest	http://nwenergy.org/wp-content/uploads/2011/02/NWEC_Solving-the-EE-Puzzle.pdf
Consortium for Building Energy Innovation	http://cbei.psu.edu/
California Sustainability Alliance: Green Leases Toolkit	http://sustainca.org/green_leases_toolkit
BOMA: Guide to Sustainable and Energy Efficient Leasing for High-Performance Buildings	https://store.boma.org/shopping_product_detail.asp?pid=52268