The Big Questions for NZ Climate Change

1. How much reforestation will be required for NZ to meet the RERP ? In other words, how many hectares, in order to increase the sink from projected 2017 figure of 18.8 Mtns up to the required 36.9 Mtns in 2039?[1]

The calculation:

The sink in 1990 was 28.9[2]

Sink in 2017 (projected) 18.8[3]

Sink in 2039 to be 36.9

Increase required = 18Mtn

How much do trees sequester? Take Cypress as an average sequestering species, and following the lookup tables[4] :

Sequestration by 1 ha = 464.4 Tonnes CO_2[5] cumulative over 22 years (2018-2039)

In order to increase by 18 Mtns in 2039 that is **62600 ha/ year to be planted.**

Now this would be allocated between incentivized on-farm planting and planting by the government on public land. In what proportion would they be?

According to the NZ Post-carbon analysis "The Afforested Dairy Farm," whereby the typical farm plants 10 ha in 2018, another 10 ha in 2028 and a third 10 ha in 2038, in order for its on-farm emissions to track the RERP, this would mean that NZ's 11,970 dairy farms would plant 359,000 hectares in total. This is an average of 16,322 ha per year.

Now assuming sheep and beef farms planted an equivalent amount, (16,332), the yearly average would be 48,996 ha. for sheep, beef and dairy combined

Conclusion:

Total amount of required reforestation =	**62,600 ha. per year**	**(1.377 m ha.)**
Planted by sheep, beef and dairy =	**48,996 ha. per year**	**(1.O77 m ha)**
Therefore Govt land to be planted =	**13,600 ha. per year**	**(299,200 ha.)**

NZ land allocation is currently

Farms	**11.4**	**(9.4% to be reforested)**
Exotic forest	**1.7**	**(81% increase)**
Indigenous	**6.5**	**(no new forest)**
Other	**7.2**	**(3.7% to be reforested)**

Chart 1. Calculations for number of hectares to be planted

Hectares to plant to get forests to 18Mtns more in 2039				
	Cypress			
	tns/ ha	50 ha/yr	62,600ha/yr	Mtns
	cumulative			required
2017				18.8
2018	715.5	35,775,000.00	44,790,300.00	19.622
2019	691.9	34,595,000.00	43,312,940.00	20.444
2020	667.8	33,390,000.00	41,804,280.00	21.266
2021	643.4	32,170,000.00	40,276,840.00	22.088
2022	618.6	30,930,000.00	38,724,360.00	22.91
2023	569.5	28,475,000.00	35,650,700.00	23.732
2024	568.1	28,405,000.00	35,563,060.00	24.554
2025	542.5	27,125,000.00	33,960,500.00	25.376
2026	516.6	25,830,000.00	32,339,160.00	26.198
2027	490.6	24,530,000.00	30,711,560.00	27.02
2028	464.4	23,220,000.00	29,071,440.00	27.842
2029	438.1	21,905,000.00	27,425,060.00	28.664
2030	411.9	20,595,000.00	25,784,940.00	29.486
2031	385.7	19,285,000.00	24,144,820.00	30.308
2032	359.7	17,985,000.00	22,517,220.00	31.13
2033	334	16,700,000.00	20,908,400.00	31.952
2034	308.7	15,435,000.00	19,324,620.00	32.774
2035	284	14,200,000.00	17,778,400.00	33.596
2036	260	13,000,000.00	16,276,000.00	34.418
2037	237.6	11,880,000.00	14,873,760.00	35.24
2038	216	10,800,000.00	13,521,600.00	36.062
2039	198.5	9,925,000.00	12,426,100.00	36.9
2040	180.9	496,155,000.00	621,186,060.00	621.582
2041	158.4			
2042	126.4			
2043	95.1			
2044	66.9			
2045	40.1			
2046	23.8			
2047	11.9			
2048	4.4			
2049	0.7			
2050	0			

Explanation of the chart and calculations

Column 1 is the cumulative sequestration from 1 hectare of cypress forest, according to the lookup table . the highest number is at the top because trees planted in 2018 will have the full 22 years of sequestration and go on increasing their sequestration past 2039, when an increase is no longer required, but no new trees will be planted. Lower numbers are further down because in later years new plantings will be younger and thus be sequestering less.

Column 2 shows the accumulated sequestration for 50,000 hectares per year planted over 22 years, showing that is not enough to reach the required cumulative sequestration of 621 Mtns shown in column 4.

Column 3 shows the sequestration of 62,600 ha per year, with its cumulative effect matching the required amount of sequestration.

Note: no new plantings will be required after 2039, because the already planted trees will continue to increase sequestration although only maintenance, not an increase, is required.

References

1. *"New Zealand as a Net Carbon Sink"* www.climatefirstnz.org
2. *NZ Greenhouse Gas Inventory* – MFE
3. *NZ Second Biennial Report* – MFE
4. *Lookup tables for post-1989 forest land* - MPI
5. *The Afforested Dairy farm* – www.climatefirstnz.org