

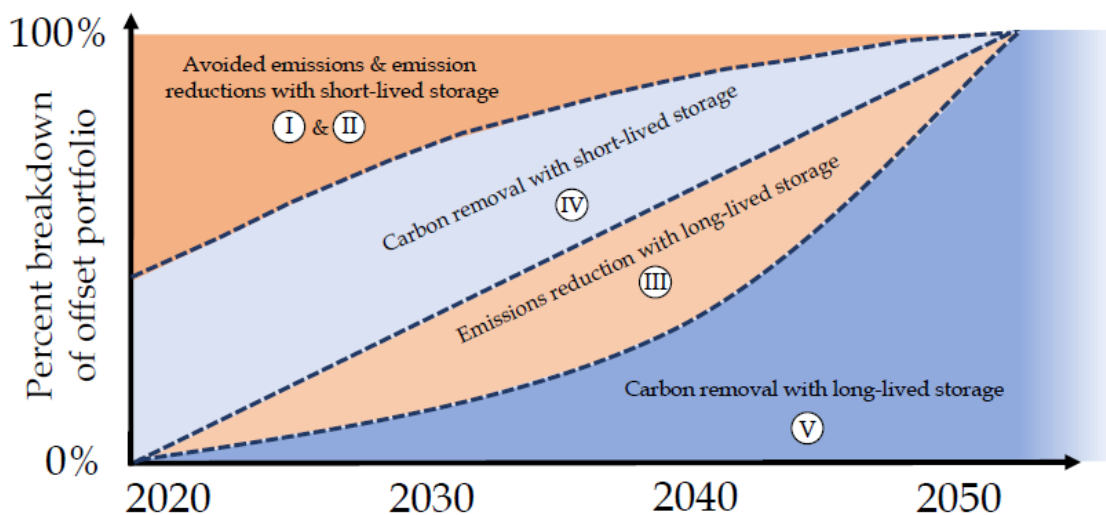
Supporting Notes for 001-OxC ex-ante carbon issuance profiles

Any ex-ante issuance numbers published within an OxCarbon project document should be regarded as purely illustrative and should not be used in any way to imply certainty of credit issuance, or a forecast of such. All credit issuance is calculated solely from data that allows a science-based assessment of climate impact for the relevant crediting period. However, it is useful for project developers and financiers to understand what issuance could potentially be under certain scenarios. The provision of ex-ante numbers facilitates that.

As ex-post data is collected, the ex-ante assumptions will be replaced and forward issuance profiles updated on that basis.

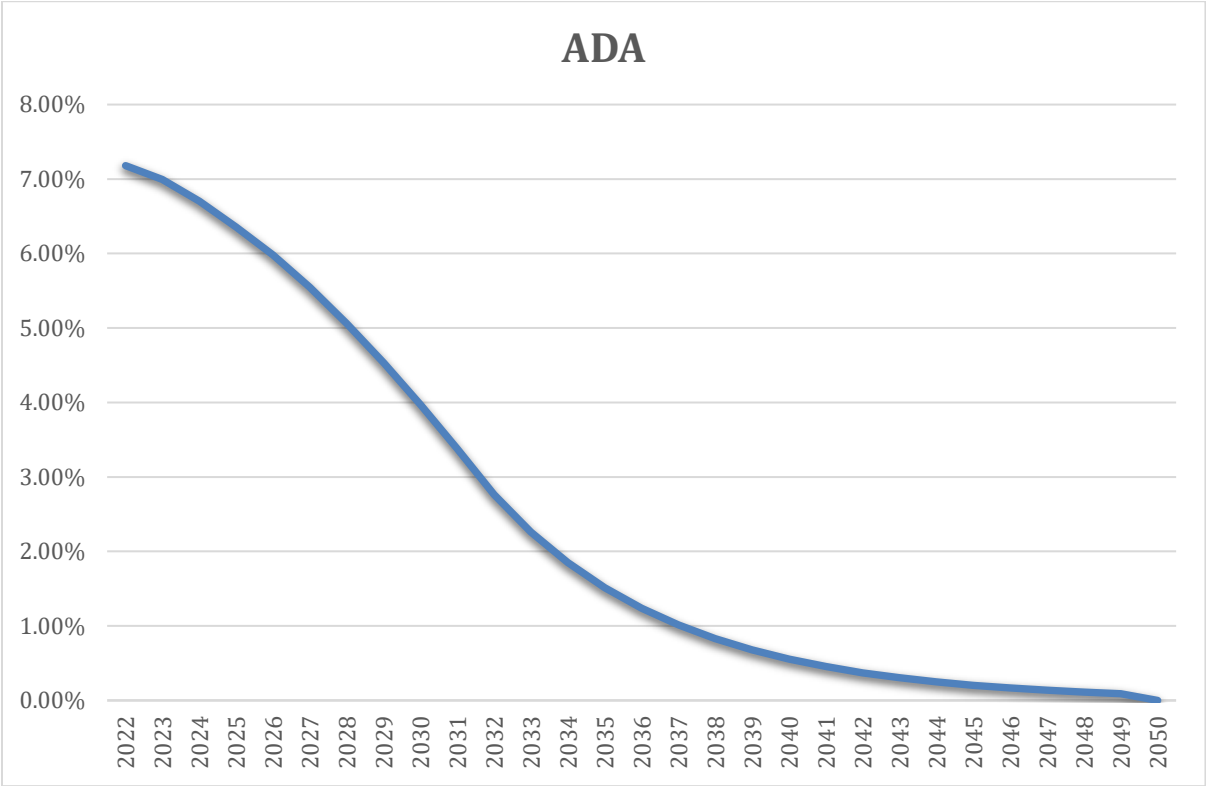
Baseline profile

In order to be consistent with the Oxford Principles for Net Zero Aligned Carbon Offsetting, the project should display a shift towards long-lived storage with offsets being purely removals by 2050.



To achieve that, future deforestation is initially assumed to be zero (after the project start date) and then a 10-year moving average of a 10-year exponential average is used to create the projected profile.

A value of zero is enforced from 2050 onwards to ensure no credits are issued for avoided emissions beyond that date.



This approach allows crediting for avoided emissions in the early part of the project whilst also incentivising investment in removals during that time.

Table 1: ADA projected profile

	ADA
2022	7.18%
2023	6.99%
2024	6.70%
2025	6.35%
2026	5.98%
2027	5.55%
2028	5.06%
2029	4.53%
2030	3.97%
2031	3.38%
2032	2.76%
2033	2.26%
2034	1.85%
2035	1.51%
2036	1.24%
2037	1.01%
2038	0.83%
2039	0.68%
2040	0.55%
2041	0.45%
2042	0.37%
2043	0.30%
2044	0.25%
2045	0.20%
2046	0.17%
2047	0.14%
2048	0.11%
2049	0.09%
2050	0.00%

Project Reserve pool

To minimise the risk of reversals, a high proportion of issuance in the early years must be placed into the Reserve with that proportion declining over time. This ensures the project reaches the target of 25% of all possible issuance in the Reserve as quickly as possible. The projected profile for the Reserve allocation is set out in Table 2:

Table 2: % of issuance into Reserve

	Reserve %
2022	55.00%
2023	45.91%
2024	38.47%
2025	32.39%
2026	27.41%
2027	23.33%
2028	20.00%
2029	17.27%
2030	15.04%
2031	13.22%
2032	11.72%
2033	10.50%
2034	9.50%
2035	8.68%
2036	8.01%
2037	7.46%
2038	7.02%
2039	6.65%
2040	6.35%
2041	6.10%
2042	5.90%
2043	5.74%
2044	5.60%
2045	5.49%
2046	5.40%
2047	5.33%
2048	5.27%
2049	5.22%
2050	5.18%

Nursery planting & restoration work

The project intends to finance the planting of 250,000 new mangrove trees per year. Assuming a typical planting density of 5,000 trees per hectare and a 40% mortality rate over the next 10 years, the afforestation plan is the equivalent of 50 hectares of new planting annually. This equates to 2.16% of the total project area per annum or 43% over 20 years.

Following the approach of the Worldview Foundation (<https://wif.foundation/ongoing-projects>), the significant amount of soil sample studies for the project baselining allows a precise estimate of annual change in soil carbon stock per hectare (SCS). An initial assumption is that the measured SCS of 363.54 tn/ha is reached over 100 years, that results in 3.6354 tC/ha/year for spoil depth around 1m. This number lies within the range of 0.1 to 10.2 tC/ha/yea published by the IPCC in the '2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands'. The width of that range reflects the degree to which local conditions are the primary factors hence it is more appropriate to utilise the number derived from local soil samples than any generic average or study.

For ex-ante estimation of tree growth, we use the DBH values provided by the Mangrove Service Network:

Year	DBH (cm)
1	0.5
2	0.8
3	1.5
4	3.2
5	4.4
6	6.4
7	7.5
8	9
9	10.4
10	11.5
11	12.5
12	13.5
13	14.5
14	14.9
15	15
16	15.3
17	15.4
18	15.7
19	15.8
20	16

The tree is conservatively assumed not to grow beyond year 20 although that would be unlikely to be the case for ex-post assessments.

For AGB estimation, we use the generic allometric equation from Soewarsono (1990)

$$0.251 * \rho * (D)^{2.46}$$

where ρ is wood density (we use a value of 0.85 from <http://db.worldagroforestry.org/> which is the value for *Rhizophora apiculata*, the dominant species in the project area) and D is diameter at breast height.

For BGB, we use the generic equation from Chapter 3 of “Protocols for the measurement, monitoring and reporting of structure, biomass and carbon stocks in mangrove forests” J. Boone Kauffman and Daniel C. Donato:

$$B_{TB} = 0.199 * \rho^{0.899} * (D)^{2.22}$$

B_{TB} = Tree belowground biomass (kg), ρ = wood density (g/cm³),
 D = tree diameter at breast height (cm).

We convert AGB to AGC with a factor of 0.47 and BGB to BGC by a factor of 0.39

The CO₂e value per tree is calculated as [AGC(tree) + BGC (tree)] *(44/12)

The projected profile per tree is therefore

Year	DBH (cm)	AGB(kg/tree)	BGB(kg/tree)	AGC(kg/tree)	BGC(kg/tree)	CO ₂ e(kg/tree)
1	0.5	0.04	0.04	0.02	0.01	0.12
2	0.8	0.12	0.10	0.06	0.04	0.36
3	1.5	0.58	0.42	0.27	0.16	1.60
4	3.2	3.73	2.27	1.75	0.89	9.68
5	4.4	8.17	4.61	3.84	1.80	20.67
6	6.4	20.53	10.60	9.65	4.13	50.52
7	7.5	30.32	15.07	14.25	5.88	73.80
8	9	47.48	22.58	22.32	8.81	114.12
9	10.4	67.76	31.13	31.85	12.14	161.30
10	11.5	86.78	38.92	40.79	15.18	205.20
11	12.5	106.53	46.83	50.07	18.26	250.56
12	13.5	128.74	55.56	60.51	21.67	301.31
13	14.5	153.48	65.11	72.14	25.39	357.61
14	14.9	164.11	69.16	77.13	26.97	381.72
15	15	166.83	70.20	78.41	27.38	387.89
16	15.3	175.16	73.35	82.32	28.61	406.75
17	15.4	177.99	74.42	83.65	29.02	413.16
18	15.7	186.64	77.68	87.72	30.29	432.72
19	15.8	189.58	78.78	89.10	30.72	439.36
20	16	195.54	81.01	91.90	31.59	452.82

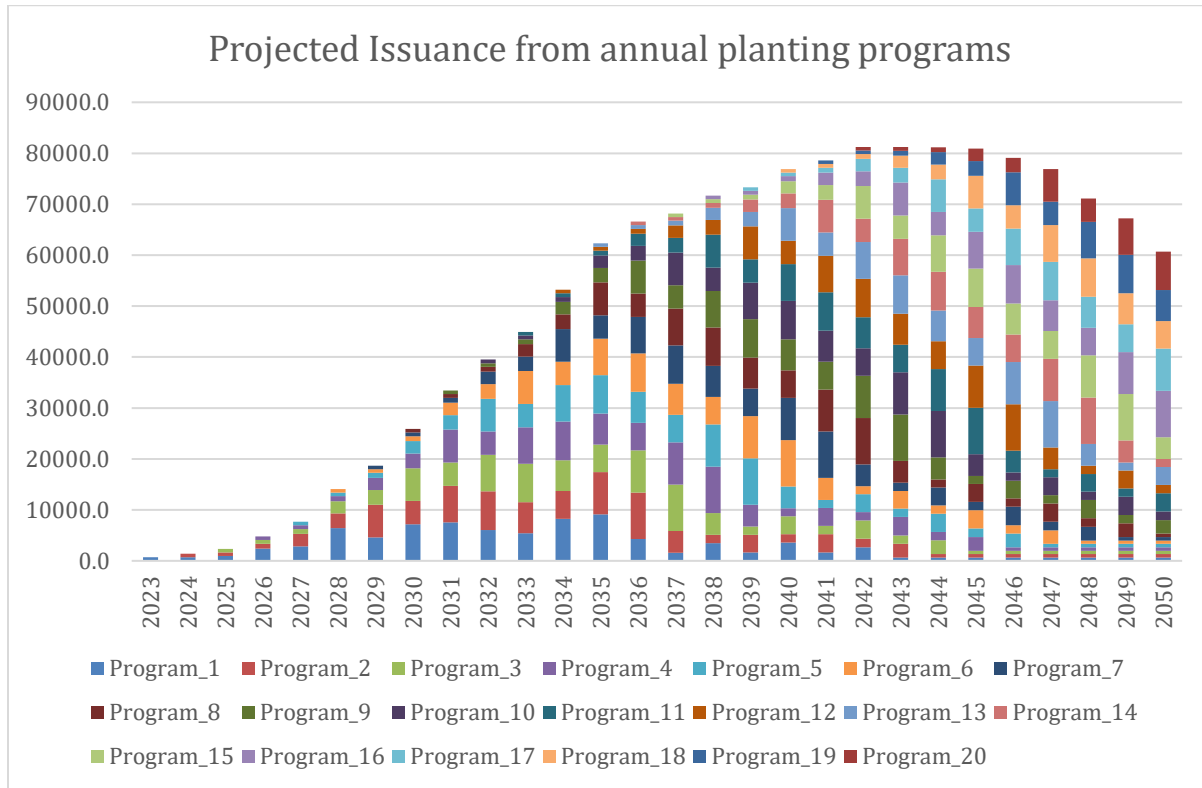
Each annual program of 250,000 trees (the equivalent of 50 hectares for the purposes of estimates SCS growth), using a mortality rate of 40% over 10 years and an annual SCS tn/ha/y rate of 3.6354 would lead to the following profile.

Year	Post Mortality	Live Trees	Tree Carbon (CO2e tn)	SCS profile (CO2e tn)	Total CO2e	Annual CO2e chg
1	100%	250,000	30	666	696	696
2	96%	240,000	87	1,333	1,420	724
3	92%	230,000	368	1,999	2,368	948
4	88%	220,000	2,130	2,666	4,796	2,428
5	84%	210,000	4,340	3,332	7,672	2,877
6	80%	200,000	10,105	3,999	14,104	6,431
7	76%	190,000	14,022	4,665	18,687	4,584
8	72%	180,000	20,542	5,332	25,874	7,187
9	68%	170,000	27,421	5,998	33,419	7,545
10	64%	160,000	32,832	6,665	39,497	6,078
11	60%	150,000	37,585	7,331	44,916	5,419
12	60%	150,000	45,196	7,998	53,194	8,278
13	60%	150,000	53,641	8,664	62,305	9,111
14	60%	150,000	57,258	9,331	66,588	4,283
15	60%	150,000	58,183	9,997	68,181	1,592
16	60%	150,000	61,013	10,664	71,677	3,496
17	60%	150,000	61,974	11,330	73,304	1,627
18	60%	150,000	64,908	11,997	76,905	3,601
19	60%	150,000	65,904	12,663	78,568	1,662
20	60%	150,000	67,923	13,330	81,253	2,685

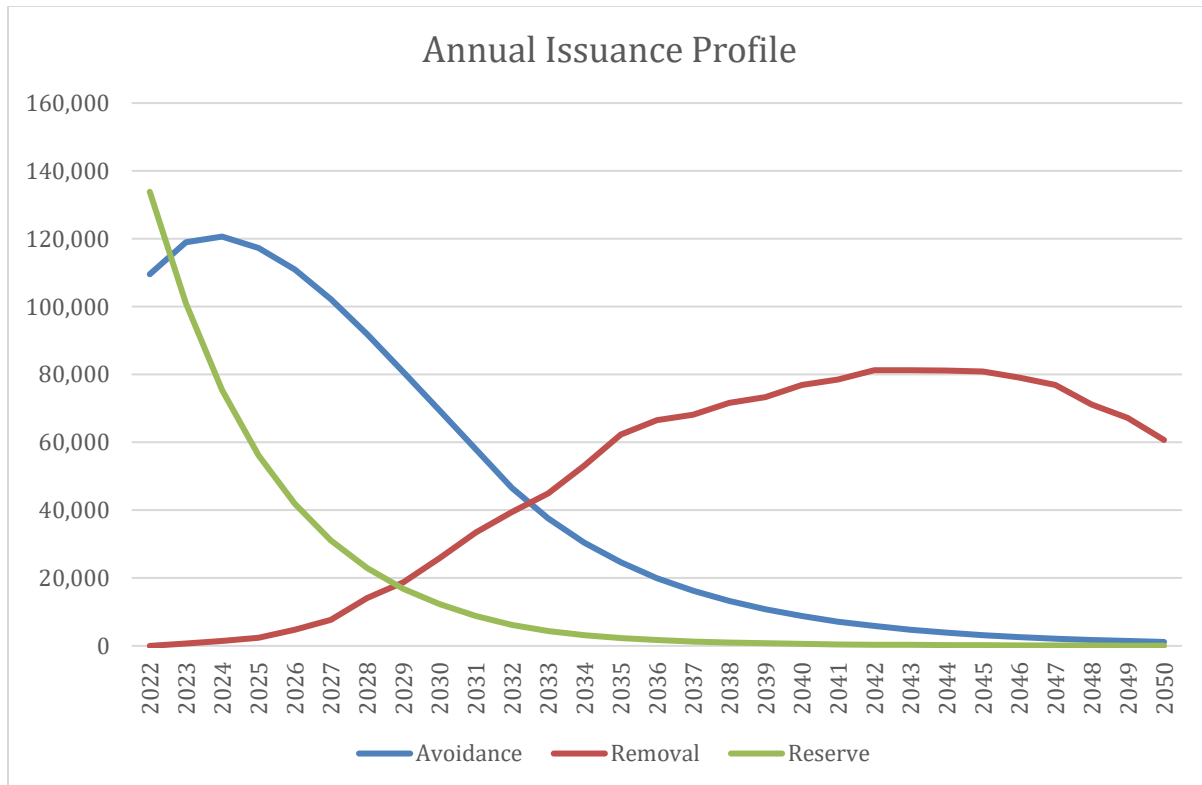
An annual program for 20 years would repeat this profile with a year lag for each planting program and would lead to the following expected issuance profile

2023	696
2024	1,420
2025	2,368
2026	4,796
2027	7,672
2028	14,104
2029	18,687
2030	25,874
2031	33,419
2032	39,497
2033	44,916
2034	53,194
2035	62,305
2036	66,588
2037	68,181
2038	71,677
2039	73,304
2040	76,905
2041	78,568
2042	81,253
2043	81,223
2044	81,166
2045	80,885
2046	79,123
2047	76,913
2048	71,148
2049	67,231
2050	60,711

The cumulative profile from an annual planting programme such as this would look as below:



The overall issuance for the project over time, broken down into Avoidance, Removal and Reserve would look as follows:



This demonstrates conformity with the shift towards removals over time, as required by the Oxford Principles.

The final ex-ante illustration for 001-OxC is set out below.

	Annual Avoidance Units	Annual Removal Units	Cumulative Reserve	Total Issuance Units	Annual issuance as % of total reserve
2022	108,939	0	133,148	108,939	82%
2023	118,388	348	233,629	118,736	51%
2024	120,012	711	308,667	120,723	39%
2025	116,653	1,190	364,540	117,843	32%
2026	110,423	2,452	406,228	112,875	28%
2027	101,674	3,991	437,171	105,666	24%
2028	91,425	7,526	460,026	98,950	22%
2029	80,385	10,174	476,809	90,559	19%
2030	69,023	14,435	489,028	83,458	17%
2031	57,624	19,129	497,803	76,753	15%
2032	46,339	23,211	503,956	69,550	14%
2033	37,376	27,156	508,340	64,532	13%
2034	30,223	32,247	511,513	62,470	12%
2035	24,490	37,858	513,841	62,347	12%
2036	19,878	40,451	515,572	60,330	12%
2037	16,158	41,363	516,876	57,522	11%
2038	13,150	43,465	517,868	56,615	11%
2039	10,712	44,399	518,631	55,110	11%
2040	8,733	46,566	519,223	55,299	11%
2041	7,124	47,522	519,686	54,646	11%
2042	5,815	49,117	520,051	54,932	11%
2043	4,748	49,102	520,340	53,850	10%
2044	3,878	49,073	520,571	52,951	10%
2045	3,169	48,927	520,755	52,096	10%
2046	2,590	47,998	520,903	50,588	10%
2047	2,117	46,792	521,022	48,909	9%
2048	1,731	43,591	521,118	45,322	9%
2049	1,415	41,276	521,196	42,691	8%
2050	1,158	37,348	521,260	38,505	7%