

# A review of tree replacement rates based on the tree's capacity to remove carbon dioxide from the atmosphere



## Key recommendations:

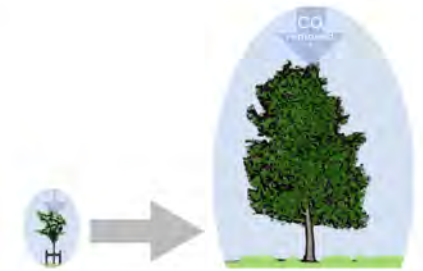
1. To support the Council's ambition to reach net-zero greenhouse gas emissions, the current rate of 3 replacement trees for 1 felled should be amended to account for the variation in carbon dioxide taken up by different trees.
2. The replacement rate should be defined by the size, condition and species of the tree to be felled as this determines the tree's carbon dioxide removal potential.
3. Trees with large diameter trunks are disproportionately valuable in terms of their contribution to climate change mitigation and should be treated with particular care.





# Based on the carbon dioxide removed from the atmosphere how many replacement trees do I need?

Example 1: A large stature species of tree is removed, and replaced by small stature species of tree.

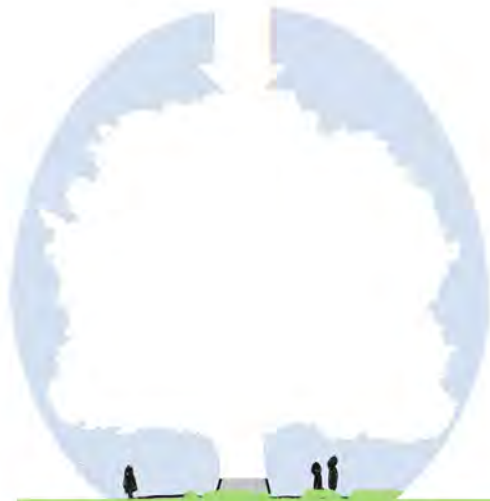


The tree to be felled.  
 Species: London Plane  
 Size at maturity<sup>1</sup>: Large  
 Trunk diameter<sup>2</sup>: 95 cm  
 Tree condition<sup>3</sup>: Category B

Tree to be felled: Group 3	Trunk diameter of the tree to be removed (cm)									
	<20	20 - 29.9	30 - 39.9	40 - 49.9	50 - 59.9	60 - 69.9	70 - 79.9	80 - 89.9	90 - 99.9	100+
Number of group 1 replacements required <sup>1</sup>	6	9	12	16	19	23	27	31	34	>38
	4	6	8	11	14	17	20	23	26	>29
	2	3	4	6	8	10	12	15	17	>20
Number of group 2 replacements required <sup>1</sup>	3	4	6	7	9	11	12	14	16	>18
	2	3	4	5	7	8	9	11	12	>14
	1	2	2	3	4	5	6	7	8	>9
Number of group 3 replacements required <sup>1</sup>	2	4	5	6	8	9	10	12	13	>15
	2	3	3	4	5	7	8	9	10	>11
	1	1	2	3	3	4	5	6	7	>8

The replacement trees  
 Planting size<sup>4</sup>: A young tree  
 e.g. Extra heavy standard  
 Size at maturity<sup>1</sup>: Small  
 e.g. Holly, Hawthorn

Key to tree condition <sup>3</sup>
Category A
Category B
Category C



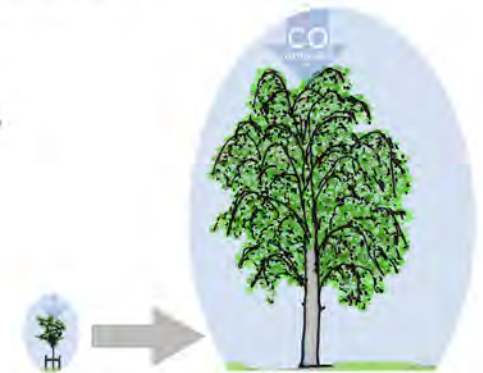
1. Groups are defined by species stature, where group 1 is small stature, group 2 is medium stature and group 3 is large stature, as defined by Hand et al, (2019a, 2019b); small stature is defined as <6 m, medium stature 6 -12 m and large stature > 12 m in a healthy isolated 20 year old specimen. 2. Tree trunk diameter is measured at 1.3 m from the ground. 3. Tree condition is defined as Category A (high quality), B (moderate quality) or C (low quality) as specified in BS 5837:2012. 4. Replacement tree is a young tree as defined by Hand et al (2019a, 2019b).

Based on the carbon dioxide removed from the atmosphere,  
how many replacement trees do I need?

Example 2: A medium stature species of tree is removed,  
and replaced by medium stature species of trees.



**Tree to be felled.**  
Species: Silver Birch  
Size at maturity<sup>1</sup>: Medium  
Trunk diameter<sup>2</sup>: 52 cm  
Tree condition<sup>3</sup>: Category C



**The replacement trees**  
Planting size<sup>4</sup>: A young tree  
e.g. Extra heavy standard  
Size at maturity<sup>1</sup>: Medium  
e.g. Silver Birch, Hornbeam

Tree to be felled: Group 2	Trunk diameter of the tree to be removed (cm)					
	<20	20 - 29.9	30 - 39.9	40 - 49.9	50 - 59.9	60+
Number of group 1 replacements required <sup>1</sup>	5	9	13	17	22	>27
	4	7	11	14	19	>23
	3	5	8	11	15	>20
Number of group 2 replacements required <sup>1</sup>	3	4	6	8	10	>13
	2	3	5	7	9	>11
	2	3	4	5	7	>9
Number of group 3 replacements required <sup>1</sup>	2	4	5	7	9	>10
	2	3	4	6	7	>9
	1	2	3	5	6	>8

Key to tree condition <sup>3</sup>
Category A
Category B
Category C

1. Groups are defined by species stature, where group 1 is small stature, group 2 is medium stature and group 3 is large stature, as defined by Hand et al, (2019a, 2019b); small stature is defined as <6 m, medium stature 6 -12 m and large stature > 12 m in a healthy isolated 20 year old specimen. 2. Tree trunk diameter is measured at 1.3 m from the ground. 3. Tree condition is defined as Category A (high quality), B (moderate quality) or C (low quality) as specified in BS 5837:2012. 4. Replacement tree is a young tree as defined by Hand et al (2019a, 2019b).

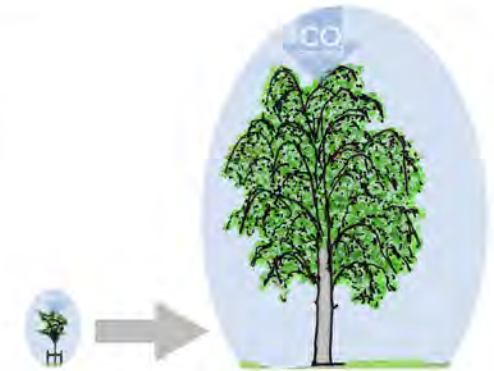


Based on the carbon dioxide removed from the atmosphere,  
how many replacement trees do I need?

Example 3: A small stature species of tree is removed,  
and replaced by medium stature species of trees.



**The tree to be felled**  
Species: Holly  
Size at maturity<sup>1</sup>: Small  
Trunk diameter<sup>2</sup>: 35 cm  
Tree condition<sup>3</sup>: Category A



**The replacement trees**  
Planting size<sup>4</sup>: A young tree  
e.g. Extra heavy standard  
Size at maturity<sup>1</sup>: Medium  
e.g. Silver Birch, Hornbeam

Tree to be felled: Group 1	Trunk diameter of the tree to be removed (cm)				
	<20	20 - 29.9	30 - 39.9	40 - 49.9	50+
Number of group 1 replacements required <sup>1</sup>	5	8	11	16	>20
	4	6	9	13	>16
	3	5	7	10	>13
Number of group 2 replacements required <sup>1</sup>	2	4	5	7	>9
	2	3	4	6	>8
	1	2	3	5	>6
Number of group 3 replacements required <sup>1</sup>	2	3	5	6	>8
	2	3	4	5	>6
	1	2	3	4	>5

Key to tree condition <sup>3</sup>
Category A
Category B
Category C

1. Groups are defined by species stature, where group 1 is small stature, group 2 is medium stature and group 3 is large stature, as defined by Hand et al, (2019a, 2019b); small stature is defined as <6 m, medium stature 6 -12 m and large stature > 12 m in a healthy isolated 20 year old specimen. 2. Tree trunk diameter is measured at 1.3 m from the ground. 3. Tree condition is defined as Category A (high quality), B (moderate quality) or C (low quality) as specified in BS 5837:2012. 4. Replacement tree is a young tree as defined by Hand et al (2019a, 2019b).