





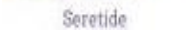
Table 1: Device Choice, Technique and Carbon Footprint




Generic Drug Name	Device Type/cost price	Device class	Carbon Footprint-kgCO ₂ /inhaler	Annual Carbon Footprint KgCO ₂	Distance Driving (9km per kg for average new car 2017)	Device technique required for effective deposition/Inspiratory flow rate required	Licensed Indication Dose per actuation/ Daily dose	Image
LONG-ACTING (LAMA)								
Acclidinium bromide	<i>Eklira Genuair</i> €33.22	DPI	Low	13.6(1)	125	Quickly and deeply within 2-3 secs /Medium	COPD 322mcgs/BD	
Glycopyrronium	<i>Seebri Breezhaler</i> €32.19	DPI	Low	6.84(1)	61.2	Quickly and deeply within 2-3 secs /Low	COPD 44mcgs/OD	
Tiotropium	<i>Spiriva Respimat</i> €30.29 Refills €24.83	SMI	Low	9.4(2) 2.4 Reusable(2)	84.6 21.6	Quickly and deeply within 2-3 secs /very low	Asthma and COPD 2.5mcgs/2 puffs OD	
	<i>Spiriva Handihaler</i> €35.02	DPI	Low	10	90	Quickly and deeply within 2-3 secs /High	COPD 10mcgs/OD	
	<i>Braltus Zonda Inhaler</i> €31.24	DPI	Low	6.84(1)	61.2	Quickly and deeply within 2-3 secs /High	COPD 10mcgs/OD	
Umeclidinium	<i>Incruse Ellipta</i> €29.78	DPI	Low	8.7(3)	78.3	Quickly and deeply within 2-3 secs /Medium Low	COPD 55mcgs/OD	
COMBINATION LONG-ACTING BETA2-AGONIST PLUS ANTICHOLINERGIC IN ONE DEVICE (LABA/LAMA)								
Formoterol/ acclidinium	<i>Brimica Genuair</i> €44.57	DPI	Low	13.6(1)	125	Quickly and deeply within 2-3 secs /Medium	COPD 340/12mcgs/BD	

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Indacaterol/ glycopyrronium	<i>Ultibro Breezhaler</i> €44.78	DPI	Low	6.8(1)	61.2	Quickly and deeply within 2-3 secs /Low	CPD 85/43mcgs/OD	
Olodaterol/ tiotropium	<i>Spiolto Respimat</i> €44.82	SMI	Low	9.3(2) 2.4(2) reused	83.7 21.6	Quickly and deeply within 2-3 secs /very low	CPD 2.5/2.5mcgs /2 puffs OD	
Vilanterol/ umeclidinium	<i>Anoro Ellipta</i> €42.13	DPI	Low	9.5(3)	85.5	Quickly and deeply within 2-3 secs /Medium Low	CPD 55/22mcgs/OD	
CORTICOSTEROID								
Beclomethasone	<i>Becotide</i> €3.05 - €15.57	MDI	20	74(4)	666	Slowly and steadily over 5 secs * /very low	Asthma 50mcgs, 100mcgs, 250mcgs/BD dosing	
	<i>Beclazone</i> €5.36 - €22.35	MDI	High 20	74(4)	666	Slowly and steadily over 5 secs * /very low	Asthma 50mcg, 100mcgs, 200mcgs/BD dosing	 NOT FOR SALE
	<i>Beclazone Easibreathe</i> €10.86 - €21.09	BaMDI	High 20	74(4)	666	Slowly and steadily over 5 secs * /very low	Asthma 100mcgs,200mcgs, 250mcgs/BD dosing	





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	QVAR €23.24	MDI	High	74(1)	666	Slowly and steadily over 5 secs * /very low	Asthma 100mcgs/BD dosing	
	QVAR Autohaler €23.24	MDI	High	74(1)	666	Slowly and steadily over 5 secs * /very low	Asthma 50mcgs,100mcgs/BD dosing	
Budesonide	Pulmicort Turbohaler €12.25- €15.31	DPI	Low	13.6(1)	122	Quickly and deeply within 2-3 secs /Medium	Asthma 100mcgs, 200mcgs, 400mcgs/BD Dosing	
Ciclesonide	Alvesco €15.90-- €19.97	MDI	High 10(5)	60	540	Slowly and steadily over 5 secs * /very low	Asthma 80mcgs, 160mcgs/BD dosing	
Fluticasone Propionate	Flixotide Evohaler €7.86 - €27.16	MDI	High	237(3)	2133	Slowly and steadily over 5 secs * /very low	Asthma 50mcgs, 125mcgs, 250mcgs/BD dosing COPD 500mcgs/BD	
	Flixotide Diskus €4.88 - €28.68	DPI	Low	10.2(3)	90	Quickly and deeply within 2-3 secs /Medium Low	Asthma 50mcgs, 100mcgs, 250mcs, 500mcgs/BD dosing COPD 500 micrograms BD	
Mometasone	Asmanex €15.57- €35.99	DPI	Low	10	90	Quickly and deeply within 2-3	Asthma	

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						secs/ Medium High	200mcgs, 400mcgs/OD or BD dosing	
COMBINATION OF LONG-ACTING BETA2-AGONIST PLUS CORTICOSTEROID IN ONE DEVICE (LABA/ICS)								
Formoterol/ budesonide	<i>Symbicort Turbohaler</i> €33.52 - €36.11	DPI	Low	13.6 (1)	122	Quickly and deeply within 2-3 secs Medium	Asthma Regular - 100/6, 200/6, 400/12 once or twice daily Max 2 inhalations of 400/12 twice daily SMART 200/6 inhaler used regularly and as required (up to 12 inhalations daily) COPD 400/12 1 inhalation BD	
	<i>Bufomix Easihaler</i> €31.86	DPI	Low 0.48	2.9(6) 0 (Offset)	26.1 0		Asthma 160/4.5 (1-4 inhalations), 320/9 (1-2 inhalations) once or twice daily COPD 320/9 1 inhalation OD	

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	<i>DuoResp Spiromax</i> €35.60 - €37.23	DPI	Low	13.6 (1)	122		Asthma 160/4.5 (1-4 inhalations), 320/9 (1-2 inhalations) OD or BD COPD 320/9 1 inhalation BDD	
Formoterol/ fluticasone	<i>Flutiform</i> €23.99 - €49.99	MDI	36.5(4)	438	3942	<u>Slowly and steadily over 5 secs</u> * /very low	Asthma 50mcg/5mcg, 125mcg/5mcg, 250mcg/10mcg 2 inhalations BD	
	<i>Flutiform k-haler</i> €24.62 - €34.45	MDI	35	420	3780	<u>Slowly and steadily over 5 secs</u> * /very low		
Indacaterol/ mometasone	<i>Ateectura Breezhaler</i>	DPI	Low	9.5*	85.5	<u>Quickly and deeply within 2-3 secs</u> /Low	Asthma 125mcg/62.5mcg, 125mcg/127.5mcg, 125mcg/260mcg 1 inhalation OD	
Salmeterol/ fluticasone	<i>Seretide Evohaler</i> €22.21- €33.26	MDI	High	237(1,3)	2133	<u>Slowly and steadily over 5 secs</u>	Asthma Evohaler - 2 inhalations bd 25/50, 25/125 or 25/250	
	<i>Seretide Diskus</i> €20.84 - €32.64	DPI	Low	11(3,7)	99	<u>Quickly and deeply within 2-3 secs</u> /	Asthma 1 inhalation bd 50/100, 50/250 or 50/500 COPD	

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							1 inhalation BD 50/ 500	
	<i>Relvar Ellipta</i> €31.7 - €36.46	DPI	Low	9.5(3, 7) 6.84(1)	61.2	Quickly and deeply within 2-3 secs /Medium Low	Asthma 184/22 or 92/22 one inhalation OD COPD 92/22 1 inhalation OD	
TRIPLE COMBINATION IN ONE DEVICE (LABA/LAMA/ICS)								
	<i>Trelegy Ellipta</i> €55.42	DPI	Low	6.8(1) 9.5(3)	61.2	Quickly and deeply within 2-3 secs /Low	Asthma 114mcg/46 mcg/ 136mcg 1 inhalation OD	
Indacaterol/ glycopyrronium / mometasone	<i>Energair Breezhaler</i>	DPI	Low	6.8(1)	61.2	Quickly and deeply within 2-3 secs /Medium Low	COPD 92mcg/55mcg/22mcg 1 inhalation OD	
BETA₂-AGONISTS								
SHORT-ACTING (SABA)								
Salbutamol	<i>Large volume</i> e.g <i>Ventolin</i> €2.46 (200 metered doses)	MDI	28 (3, 4)	n/a	252 (per inhaler)	Slowly and steadily over 5 secs* /very low	Asthma and COPD 100mcgs/1-2 puffs up to 4 times daily	
	<i>Small volume</i> e.g <i>Salamol</i> €2.96 (200 metered doses)	MDI	10 (4)	n/a	90 (per inhaler)	Slowly and steadily over 5 secs* /very low	Asthma and COPD 100mcgs/1-2 puffs up to 4 times daily	

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	<i>Salamol Easibreathe</i> €7.95	BaMDI	High 10	n/a	90 (per inhaler)	Breath activated-Slowly and steadily over 5 secs /very low	Asthma and COPD 100mcgs/1-2 puffs up to 4 times daily	
	<i>Ventolin Diskus</i> €4.48	DPI	Low 1	n/a	9 (per inhaler)	Quickly and deeply within 2-3 secs /Medium Low https://vimeo.com/138501838	Asthma and COPD 200mcgs/1 inhalation up to 4 times daily	
Terbutaline	<i>Bricanyl Turbohaler</i> €5.79	DPI	Low 1	n/a	9 (per inhaler)	Quickly and deeply within 2-3 secs /Medium	Asthma and COPD 500mcgs/1puff up to 4 times daily	
LONG-ACTING (LABA)								
Formoterol	<i>Oxis Turbohaler</i> €16.55- €20.11	DPI	Low	13.6(1)	125	Quickly and deeply within 2-3 secs /Medium	Asthma and COPD 6mcgs,12mcgs /OD or BD dosing	
	<i>Foradil Aerolizer</i> €20.34	DPI	Low	13.6(1)	125	Quickly and deeply within 2-3 secs/Low	Asthma and COPD 12mcgs/BD dosing	
Indacaterol	<i>Onbrez Breezhaler</i> €31.24	DPI	Low	6.8(1,8)	61.2	Quickly and deeply within 2-3 secs /Low	COPD 150 or 300 micrograms/OD	

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Olodaterol	<i>Striverdi respimat</i> €27.78	SMI	Low	9.3 2.4 (reusable)	83.7 21.6	Quickly and deeply within 2-3 secs /very low	COPD 2.5mcgs/2 puffs OD	
Salmeterol	<i>Serevent Evohaler</i> €23.73	MDI	17(4)	237(3)	2,133	Slowly and steadily over 5 secs */very low	Asthma 25mcgs/BD Dosing COPD 25mcgs/ 2 Puffs BD	
	<i>Serevent Diskus</i> €23.38	DPI	Low	8.7(3)	78.3	Quickly and deeply within 2-3 secs /Medium Low	Asthma 50mcgs/BD Dosing COPD 50mcgs/ 1 puff BD	
ANTICHOLINERGICS								
SHORT-ACTING (SAMA)								
Ipratropium	Atrovent €2.67	MDI	15(4)	n/a	135	Slowly and steadily over 5 secs */very low	Asthma and COPD 20mcgs/1-2 puffs up to 4 times daily	

CO₂e = CO₂ equivalent, the universal unit for measuring the global warming potential (GWP) of various greenhouse gases expressed in terms of the GWP of own unit of carbon dioxide. >25kgCO₂e = **Very High**, 10-25kgCO₂e = **High**, approx 1kgCO₂e = **Low**

*All patients using a pMDI to take inhaled medications should be advised to use a spacer for both regular and emergency medications <https://openres.ersjournals.com/content/4/2/00065-2018>
<https://greeninhaler.org/inhaler-comparison/> <https://thorax.bmj.com/content/thoraxjnl/75/1/82.full.pdf>
https://erj.ersjournals.com/content/44/Suppl_58/4635. < 0.017vkPa.min/L = very low, 0.017 - 0.019vkPa.min/L = **Low**, ≥0.020 - 0.030vkPa.min/L = **Medium Low**, ≥0.031 - 0.039vkPa.min/L = **Medium**, 0.044vkPa.min/L = **Medium High**, ≥0.050vkPa.min/L = **High**

Abbreviations:

DPI Dry powder inhaler, SMI Soft mist inhaler, MDI Metred dose inhaler, BaMDI Breath actuated metred dose inhaler, kgCO₂/inhaler equivalent kilogram of carbon dioxide generated per inhaler

Reporting of annual carbon footprint

1. Published lifecycle analysis were used in the first instance and where not available published estimates were used.
2. Annual use estimated for 2 actuations per day where more than one actuation can be used.

Calculating Carbon Footprint

Average new car in 2017 produces 112gCO₂/km equating to 9km/kgCO₂(9)

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