

# EU-Commission JRC Contribution to EVE IWG:

*Next step of GTR No. 25: HDVs' Minimum Performance Requirements,  
lifetime and metric revision*

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# UN GTR No. 25: HDVs Minimum Performance Requirements, metric and lifetime requirements

## ➤ Lifetime requirements



# Lifetime requirements, i.e., Category 1-2 vehicle exceeding 7.5 tonnes and Category 2 vehicles exceeding 16 tonnes

## En capacity fade at several thresholds in years and km

Legend		Mission Profile																																																																
		Construction ref								Long Haul ref								Municipal Utility ref								Regional Delivery ref								Urban Delivery ref																																
		15 y		700000 km		875000 km		EoL@20% capacity fade arch 1		15 y		700000 km		875000 km		EoL@20% capacity fade arch 1		15 y		700000 km		875000 km		EoL@20% capacity fade arch 1		15 y		700000 km		875000 km		EoL@20% capacity fade arch 1																																		
w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO	w/o PTO	w PTO																																			
HDV vehicle group	4	Annual km	78000								874775								98000								78000								838086								60000								776096															
		Years	15	15	8.97	8.97	11.22	11.22	11.22	11.22	15	15	7.14	7.14	8.93	8.93	7.94	7.94	15	15	8.97	8.97	11.22	11.22	12.59	12.59	15	15	8.97	8.97	11.22	11.22	10.74	10.74	15	15	11.67	11.67	14.58	14.58	12.93	12.93																								
		En-th	7.29 E+08	1.26 E+09	4.36 E+08	7.53 E+08	5.45 E+08	9.42 E+08	5.45 E+08	1.68 E+09	7.99 E+08	9.98 E+08	8.88 E+08	7.94 E+08	2.84 E+08	3.98 E+08	1.70 E+08	2.38 E+08	2.12 E+08	2.97 E+08	2.38 E+08	6.04 E+08	3.61 E+08	4.52 E+08	4.33 E+08	10.74 E+08	3.57 E+08	2.78 E+08	3.47 E+08	3.08 E+08																																				
		str21/str22 Arch 1	25.4	27.6	16.3	18.1	20.0	21.9	32.8	18.2	22.1	23.2	23.7	14.6	15.0	18.1	18.5	26.3	17.0	20.8	22.7	18.3	22.1																																											
		str21/str22 Arch 2	22.7	24.4	14.2	15.6	17.7	19.2	28.8	15.4	18.9	21.4	21.9	13.2	13.6	16.6	16.9	23.8	15.1	18.6	20.7	16.6	20.3																																											
		str21/str22 Arch 3	18.8	19.8	11.2	12.0	14.3	15.2	23.1	11.4	14.4	19.0	19.2	11.3	11.5	14.4	14.6	20.3	12.3	15.5	18.0	14.1	17.5																																											
		str25/str26 Arch 1	22.9	NaN	14.4	NaN	17.9	NaN	29.4	15.9	19.4	22.3	23.4	13.9	14.8	17.3	18.3	24.4	15.6	19.1	21.5	17.3	21.0																																											
		str25/str26 Arch 2	20.3	NaN	12.4	NaN	15.6	NaN	25.5	13.1	16.3	20.6	21.4	12.6	13.2	15.8	16.6	22.0	13.7	17.0	19.6	15.6	19.1																																											
		str25/str26 Arch 3	16.4	NaN	9.4	NaN	12.2	NaN	19.8	9.1	11.9	18.1	18.5	10.7	11.0	13.7	14.0	18.4	10.9	14.0	16.9	13.1	16.4																																											
		N3>16t	5	Annual km	78000								778991								116000								907988								78000								726182								78000								873575					
Years	15			15	8.97	8.97	11.22	11.22	9.99	9.99	15	15	6.03	6.03	7.54	7.54	7.83	7.83	15	15	8.97	8.97	11.22	11.22	9.31	9.31	15	15	8.97	8.97	11.22	11.22	11.20	11.20																																
En-th	1.04 E+09			1.57 E+09	6.19 E+08	9.37 E+08	7.74 E+08	1.17 E+09	6.85 E+08	1.86 E+09	7.46 E+08	9.33 E+08	9.68 E+08	1.07 E+09	6.40 E+08	8.00 E+08	6.64 E+08	7.29 E+08	4.36 E+08	5.45 E+08	5.44 E+08																																													
str21/str22 Arch 1	27.8			29.1	18.2	19.3	22.1	23.3	33.2	15.8	19.4	29.3	19.4	23.4	25.4	16.4	20.0																																																	
str21/str22 Arch 2	24.6			25.6	15.7	16.5	19.3	20.2	29.0	12.1	16.4	26.0	16.8	20.6	22.7	14.3	17.7																																																	
str21/str22 Arch 3	20.0			20.6	12.1	12.6	15.3	15.8	22.9	9.2	12.0	21.4	13.2	16.5	18.8	11.2	14.3																																																	
str25/str26 Arch 1	24.2			NaN	15.4	NaN	19.0	NaN	29.3	13.4	16.6	25.8	16.6	20.3	23.0	14.5	17.9																																																	
str25/str26 Arch 2	21.1			NaN	13.0	NaN	16.2	NaN	25.1	10.7	13.6	22.6	14.1	17.6	20.3	12.4	15.6																																																	
str25/str26 Arch 3	16.5			NaN	9.4	NaN	12.3	NaN	19.2	6.8	9.3	18.0	10.6	13.6	16.5	9.4	12.2																																																	

- Lifetime requirements

<b>12y, 700 000km</b>
<b>15y, 875 000km</b>



Example: 98000 km/year  
**7.14** years for 700000km vs 12 years  
**8.93** years for 875000km vs 15 years  
 EoL@20% 7.94 years

Example: 78000 km/year  
**8.97** years for 700000km vs 12 years  
**11.22** years for 875000km vs 15 years  
 EoL@20% 10.74 years



# Lifetime requirements

HDV vehicle group	Capacity fade in [%] km and Years Driving to Set Threshold	Mission Profile [-]																																																	
		Construction ref					LongHaul ref					MunicipalUtility ref					RegionalDelivery ref					UrbanDelivery ref																													
		12y	15y	70000km	875000km	EoL@20%	12y	15y	70000km	875000km	EoL@20%	12y	15y	70000km	875000km	EoL@20%	12y	15y	70000km	875000km	EoL@20%	12y	15y	70000km	875000km	EoL@20%																									
		w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO	w/o PTO																									
4	annual km	78000					874774					98000					778562					78000					981993					78000					838086					60000					776095				
	years	12	15	8.97	11.22	11.22	12	15	7.14	8.93	7.94	12	15	8.97	11.22	12.59	12	15	8.97	11.22	10.74	12	15	11.67	14.58	12.93																									
	h-throughput W	5.83E+08	7.29E+08	4.36E+08	5.45E+08	5.45E+08	1.34E+09	1.68E+09	7.99E+08	9.98E+08	8.88E+08	2.27E+08	2.84E+08	1.70E+08	2.12E+08	2.38E+08	4.83E+08	6.04E+08	3.61E+08	4.52E+08	4.33E+08	2.86E+08	3.57E+08	2.78E+08	3.47E+08	3.08E+08																									
	str21/arch 1	21.2	25.4	16.4	20.0		27.9	32.8	18.2	22.1		19.2	23.2	14.6	18.1		22.0	26.3	17.0	20.8		18.7	22.7	18.3	22.1																										
str25/arch 1	19.0	22.9	14.4	17.9		24.8	29.4	15.9	19.4		18.4	22.3	13.9	17.3		20.3	24.4	15.6	19.1		17.7	21.5	17.3	21.0																											
5	annual km	78000					778991					116000					907988					78000					726183					78000					873575														
	years	12	15	8.97	11.22	9.99	12	15	6.03	7.54	7.83	12	15	8.97	11.22	9.31	12	15	8.97	11.22	9.31	12	15	8.97	11.22	11.20																									
	h-throughput W	8.28E+08	1.04E+09	6.19E+08	7.74E+08	6.89E+08	1.48E+09	1.86E+09	7.46E+08	9.33E+08	9.68E+08						8.55E+08	1.07E+09	6.40E+08	8.00E+08	6.64E+08	5.83E+08	7.29E+08	4.36E+08	5.45E+08	5.44E+08																									
	str21/arch 1	23.3	27.8	18.2	22.1		28.2	33.2	15.8	19.4							24.7	29.3	19.4	23.4		21.2	25.4	16.4	20.0																										
str25/arch 1	20.1	24.2	15.4	19.0		24.7	29.3	13.4	16.6							21.5	25.8	16.6	20.3		19.0	23.0	14.5	17.9																											
9	annual km	73000					788625					108000					809487					73000					825013					73000					727336														
	years	12	15	9.59	11.99	10.80	12	15	6.48	8.10	7.50	12	15	9.59	11.99	11.30	12	15	9.59	11.99	9.96	12	15	9.59	11.99	9.96																									
	Eh-throughput	6.29E+08	7.86E+08	5.03E+08	6.28E+08	5.66E+08	1.61E+09	2.01E+09	8.70E+08	1.09E+09	1.01E+09	4.82E+08	6.02E+08	3.85E+08	4.81E+08	4.54E+08	6.43E+08	8.04E+08	5.14E+08	6.42E+08	5.34E+08																														
	str21/arch 1	21.9	26.2	18.0	21.8		29.1	34.2	17.6	21.4		21.1	25.3	17.3	21.0		23.4	27.8	19.3	23.3																															
str25/arch 1	19.5	23.5	15.9	19.5		NaN	NaN	NaN	NaN		19.3	23.3	15.7	19.3		21.1	25.3	17.3	21.0																																
N3>16t 10	annual km						107000					843679										68000					644164																								
	years						12	15	6.54	8.18	7.88						12	15	10.29	12.87	9.47																														
	h-throughput W						1.41E+09	1.76E+09	7.68E+08	9.61E+08	9.26E+08						7.71E+08	9.63E+08	6.61E+08	8.27E+08	6.08E+08																														
	str21/arch 1						28.0	33.0	17.0	20.6							24.3	28.9	21.5	25.7																															
str25/arch 1						NaN	NaN	NaN	NaN							21.5	25.8	18.9	22.8																																
11	annual km	75000					787102					75000					608594					75000					0					813121					75000					738739									
	years	12	15	9.33	11.67	10.49	12	15	9.33	11.67	8.11	12	15	9.33	11.67	10.84	12	15	9.33	11.67	9.85	12	15	9.33	11.67	9.85																									
	Eh-throughput	6.98E+08	8.73E+08	5.43E+08	6.79E+08	6.11E+08	1.18E+09	1.48E+09	9.20E+08	1.15E+09	8.00E+08	5.54E+08	6.92E+08	4.31E+08	5.38E+08	5.00E+08	7.10E+08	8.88E+08	5.52E+08	6.91E+08	5.83E+08																														
	str21/arch 1	22.4	26.7	18.0	21.9		27.4	32.4	22.5	26.8		21.8	26.1	17.5	21.3		23.6	28.1	19.1	23.0																															
str25/arch 1	19.7	23.8	15.7	19.3		NaN	NaN	NaN	NaN		19.9	23.9	15.8	19.4		21.0	25.2	16.8	20.5																																
12	annual km	105000					988682					105000					807136					105000					880986																								
	years	12	15	6.67	8.33	9.42	12	15	6.67	8.33	7.69						12	15	6.67	8.33	8.39																														
	Eh-throughput	1.19E+09	1.49E+09	6.61E+08	8.26E+08	9.33E+08	1.51E+09	1.88E+09	8.37E+08	1.05E+09	9.65E+08						1.30E+09	1.62E+09	7.21E+08	9.02E+08	9.08E+08																														
	str21/arch 1	24.4	29.0	14.6	18.0		28.6	33.6	17.7	21.4							26.7	31.6	16.3	19.9	0.00																														
str25/arch 1	19.3	23.3	10.8	13.7		NaN	NaN	NaN	NaN							21.5	25.8	12.4	15.5	0.00																															
16	annual km	60000					617753																																												
	years	12	15	11.67	14.58	10.30																																													
	Eh-throughput	6.58E+08	8.22E+08	6.40E+08	8.00E+08	5.64E+08																																													
	str21/arch 1	22.7	27.1	22.2	26.6																																														
str25/arch 1	NaN	NaN	NaN	NaN	NaN																																														

**12y, 700 000km**  
**15y, 875 000km**



Example  
9-10? years for 700000km vs 12 years  
11-12? years for 875000km vs 15 years



# MPRs Metric proposal: optional annex & different metrics (years, km, En-th in monitoring)

## Optional Annex 4 Category 2

<b>MPRs Metrics</b> Years, km whichever comes first En-throughput in monitoring		
<b>Category 2 vehicles not exceeding 16 tonnes (GVW)</b>		
	HD- OVC-HEV	HD-PEV
6y, 150 000km	70%	70%
<b>8y(75%), 300 000km(80%)</b>	70%	70%
8y, 400 000km	70%	70%
<b>10y(70%), 375 000km(75%)</b>	65%	65%

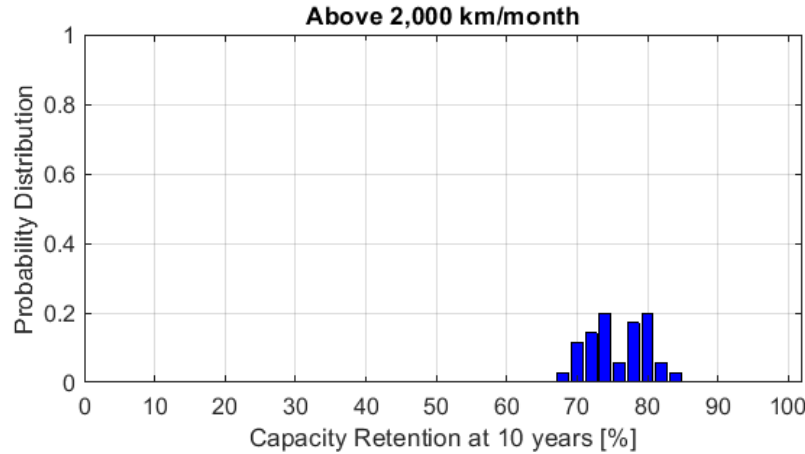
<b>MPRs Metrics</b> Years, km whichever comes first En-throughput in monitoring		
<b>Category 2 vehicles exceeding 16 tonnes (GVW)</b>		
	HD- OVC-HEV	HD-PEV
6y, 150 000km	70%	70%
8y, 600 000km	70%	70%
<b>12y(60%), 700 000km(70%)</b>	55%	55%
<b>15y(55%), 875 000km(65%)</b>	50%	50%



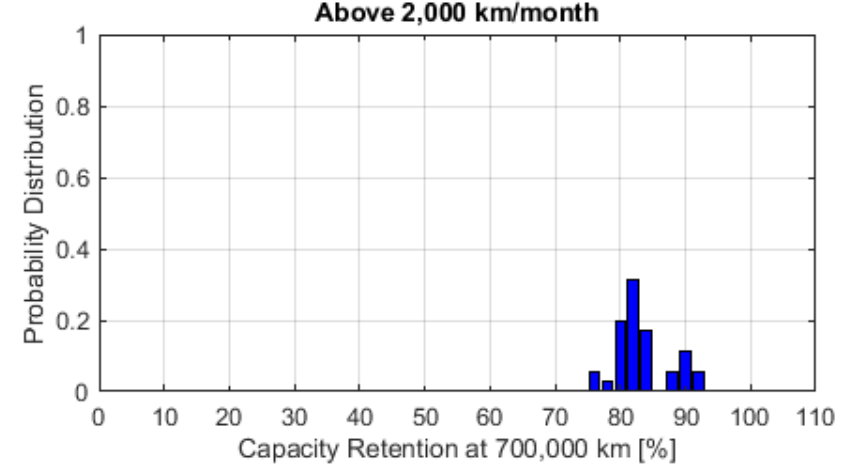
# Capacity retention eHDVs N3>16t - Vehicle groups 4,5,9,10,11,12,13,16

Str. 21 DC 1.2MW & Str. 22 DC 600kW Lunch break opportunistic – All mission profiles

at 4210 years

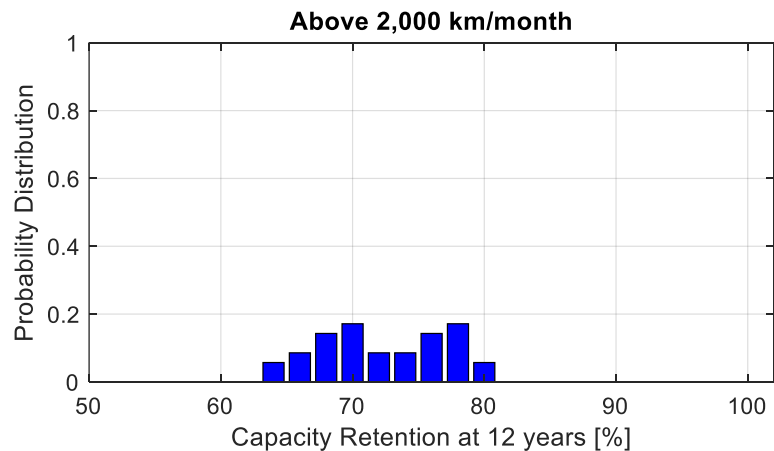


at 700,000 km (before in time)

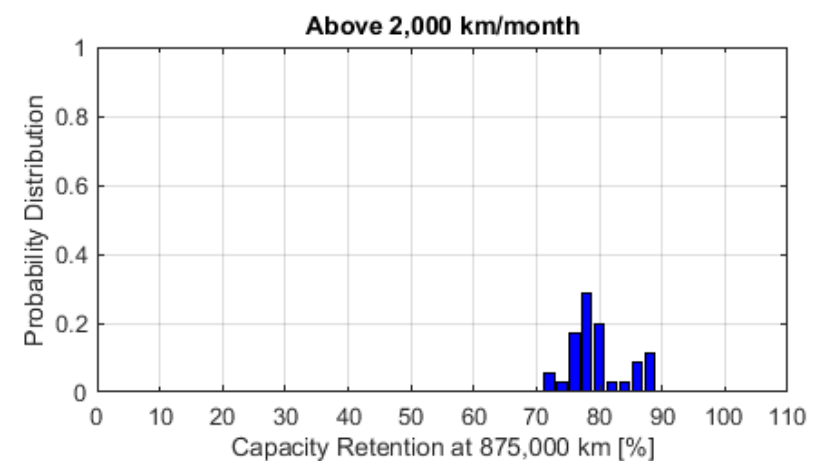


>65% ?

at 4512 years



at 875,000 km (before in time)



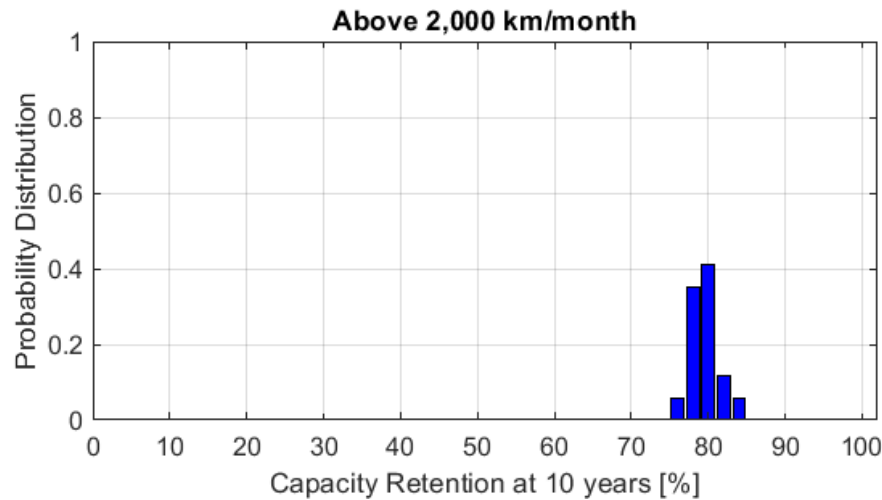
>60% ?



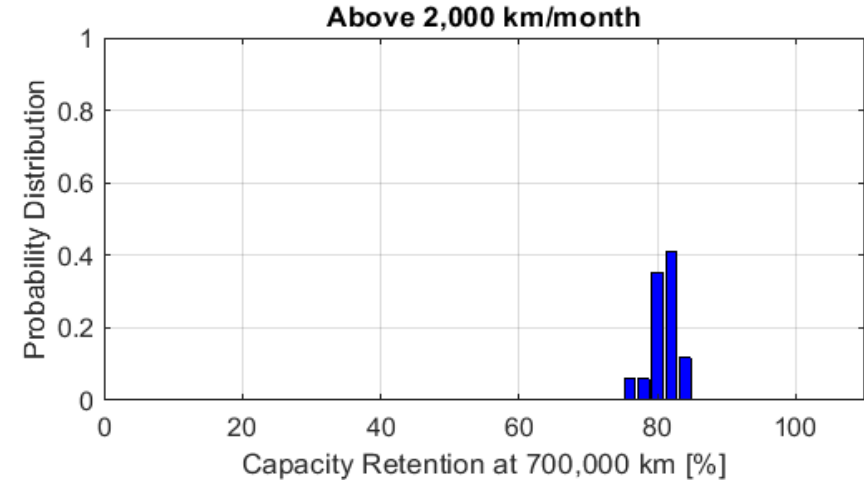
# Capacity retention eHDVs N3>16t - Vehicle groups 4,5,9,10,11,12,13,16

Str. 21 DC 1.2MW & Str. 22 DC 600kW Lunch break opportunistic – All mission profiles except LH

at ~~4210~~ years

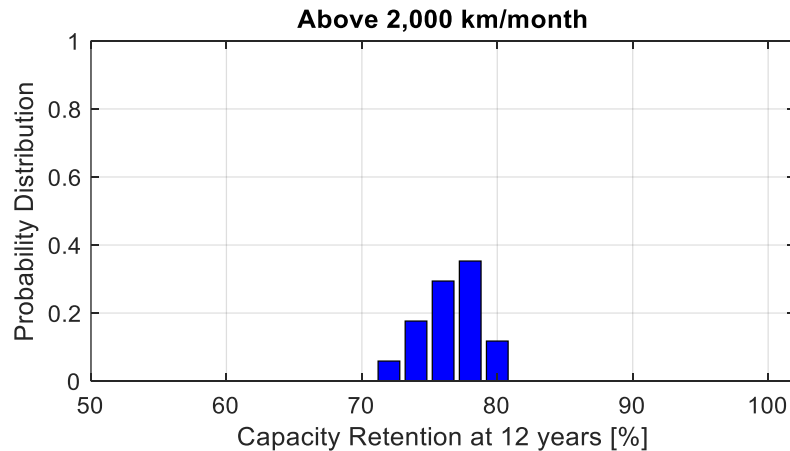


at 700,000 km (before in time)

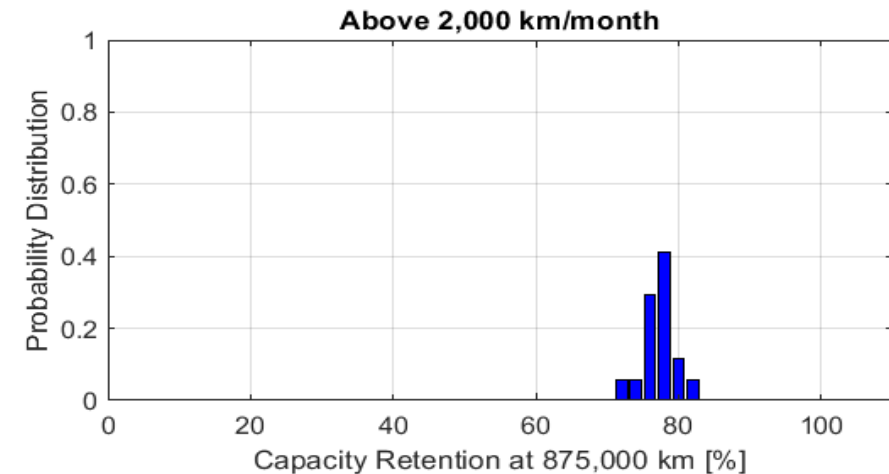


>70% ?

at ~~4512~~ years



at 875,000 km (before in time)



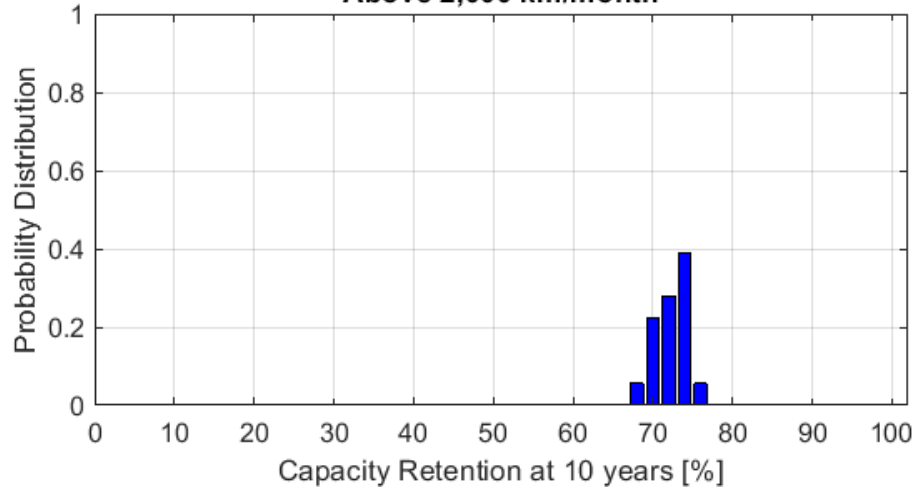
>65% ?



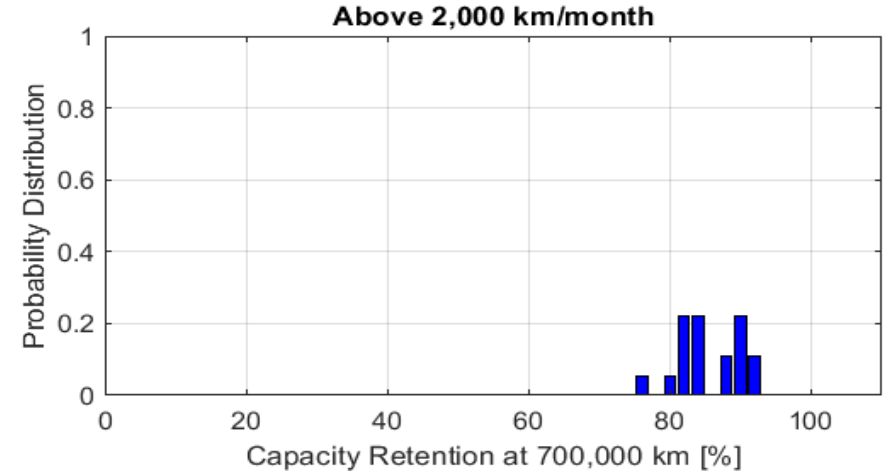
# Capacity retention eHDVs N3>16t - Vehicle groups 4,5,9,10,11,12,13,16

Str. 21 DC 1.2MW & Str. 22 DC 600kW Lunch break opportunistic – **ONLY LH**

at ~~4210~~ 4512 years  
Above 2,000 km/month

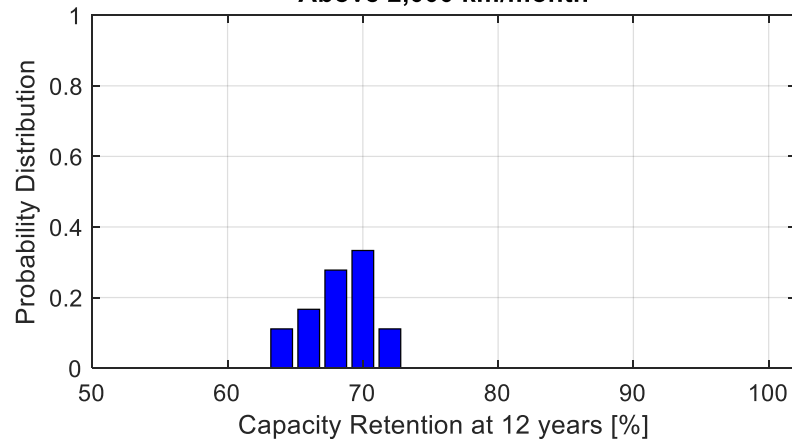


at 700,000 km (before in time)

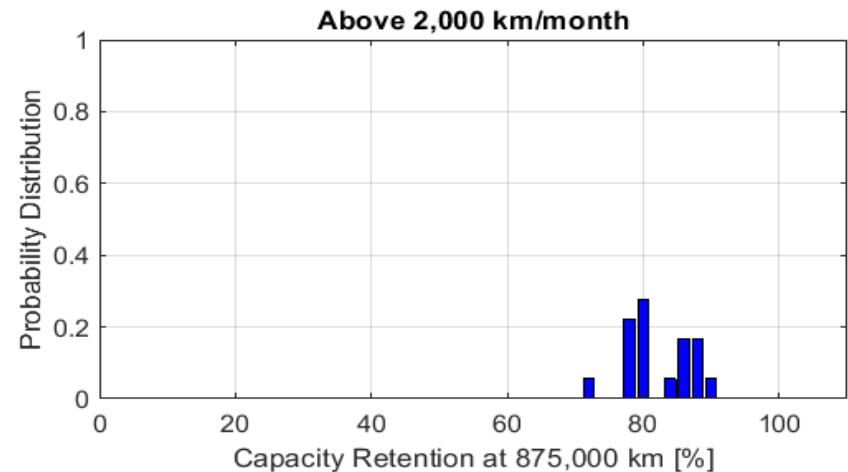


>65% ?

at ~~4512~~ 4512 years  
Above 2,000 km/month



at 875,000 km (before in time)



>60% ?



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# Thank you

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