

## WLTP Roadmap Appendix - Estimated Resources

Item	Drafting Group/TS			ACEA				Comments
	Cost	Manpower	Manpower cost	assumption	costs	manpower	manpower costs	
1. Phase I - Test Procedure								
1.1. DHC Team Work								
<b>1.1.1. in use data collection</b>								
1.1.1.1. Preparation		500	50'000 €	2 weeks per region		400	40'000 €	
assumption 5 CPs		2000	200'000 €					
1.1.1.1.1. review current process data								
1.1.1.1.2. selection of test vehicles								
1.1.1.1.3. selection of areas, road types, test conditions and routes								
1.1.1.1.4. planning								
1.1.1.2. data collection	130'000 €	160	16'000 €	vehicle costs	450'000 €			
assumption 15 cities	1'820'000 €	2'240	224'000 €	driver costs		6000	480'000 €	
1.1.1.3. data check and review		1'500	150'000 €	100 hours per region		500	50'000 €	3 institutes: JARI, EPA, FIGE
1.1.1.4 statistical data		150	15'000 €	1 week per region		200	20'000 €	
				100 hours analysis		100	10'000 €	
1.1.2. additional data collection if necessary								
<b>1.1.3. data analysis methodology</b>								
1.1.3.1. initial development	1'200 €	500		2 trips + 600 hours	4'000 €	600	60'000 €	
1.1.3.2. modification	1'200 €	250		2 trips + 400 hours	4'000 €	400	40'000 €	
<b>1.1.4. Develop new driving cycle</b>								
1.1.4.1. development of initial mode	2'400 €	2'000		4 trips + 2*240 hours	8'000 €	480	48'000 €	2 institutes:
1.1.4.1.1. mode structure								
1.1.4.1.2. mode duration								
1.1.4.1.3. weighting factor (urban, rural, motorway)								
1.1.4.1.4. number of short trip/idling								
1.1.4.1.5. gearshift points								
1.1.4.1.6. OBD impact								
1.1.4.2. modification	2'400 €	2'000		4 trips + 2*160 hours	8'000 €	320	32'000 €	2 institutes:
1.1.4.2.1. weighting factor (urban, rural, motorway)								
1.1.4.2.2. arrangement of short trip/idling								
1.1.4.2.3. gearshift points								
1.1.4.2.4. cold/hot start								
1.1.4.3. final modification	1'200 €	1'500		2 trips + 2*100 hours	4'000 €	200	20'000 €	
<b>1.1.5. Validation tests</b>								
1.1.5.1. preparation		160						
1.1.5.1.1. test items								
1.1.5.1.2. test vehicle matrix								
1.1.5.1.3. procure test vehicles					25'000 €			
1.1.5.1.4. test site preparation								
1.1.5.2. Validation 1 (current test procedure)	50'000 €	320		3 tests, 10 vehicles	36'000 €			
1.1.5.3. Validation 2 (new test procedure)	300'000 €	2'000		3 rounds of 3 tests, 10 vehicles	115'800 €			

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1.1.5.4. validation test analysis				3 rounds of 3 evap tests, 5 vehicles	292'500 €			
<b>1.1.6. confirmation tests / RR</b>								
1.1.6.1. preparation		80						
1.1.6.1.1. test items								
1.1.6.1.2. test vehicle matrix								
1.1.6.1.3. procure test vehicles					5'000 €			
1.1.6.1.4. test site preparation								
1.1.6.2. confirmation tests	40'000 €	200		1 test, 5 vehicles	7'300 €			
1.1.6.3. Round Robin								
1.1.6.3.1. test items								
1.1.6.3.2. test vehicle matrix								
1.1.6.3.3. procure test vehicles					50'000 €			
1.1.6.3.4. RR tests	50'000 €	200		1 test, 2 vehicles / lab	73'000 €			
				transport	180'000 €			
				controlling engineer 3 days per lab	50'000 €	3000	300'000 €	
1.1.6.3.5. correlation between labs								
1.1.6.4. small modification to driving cycle								
1.2. DTP Team Work								
1.2.1. Terminology		800						
<b>1.2.2. Test procedure</b>	30'000 €	2'000			100'000 €			ISO
1.2.2.1. emission constituent								
1.2.2.2. inertia weight class								
1.2.2.3. road load measurement								
1.2.2.4. Pre conditioning / state of charge								
1.2.2.5. electric load								
1.2.2.6. calculation formulae								
1.2.2.7. (Alternative fuelled vehicles (FFV, CNG, LPG, H2)								
1.2.2.8. hybrid vehicle (HEV, PHEV)								
1.2.2.9. electric vehicle (BEV, FCV)								
1.2.2.10. Energy consumption / CO2								
1.2.2.11. establish list of required reference fuels								
<b>1.2.3. Test Equipment</b>	30'000 €	2'000			100'000 €			ISO
1.2.3.1. chassis dynamometer								
1.2.3.2. analyser/CVS/tunnel								
1.2.3.3. others (fan, cylinder gas, SHED, .....)								
1.2.3.4. minimum investment								
1.2.4. Modify								
<b>1.3. engine operation outside driving cycle</b>								
1.3.1. OCE pre work: develop candidate off cycle mode								
1.3.1.1. defeat device strategy		1'500		2 trips	4'000 €	1500	150'000 €	institute:
1.3.1.2. OCE mode definition		500		1 trip	2'000 €	500	50'000 €	institute:
1.3.2. evaluation of candidate off cycle mode								
1.3.2.1. develop defeat strategy								
1.3.2.2. deficiencies								

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1.3.2.3. exemptions								
1.3.2.4. extreme ambient conditions								
1.3.2.5. driver selectable switch								
1.3.3. comparison test method				3 trips	6'000 €			
1.3.3.1. mode driving	10'000 €	250				250	25'000 €	
1.3.3.2. engine mapping	10'000 €	250				250	25'000 €	
1.3.4. develop test procedure		500				500	50'000 €	
1.3.5. OBD impact				1 vehicle, 3 tests	4'600 €	40	4'000 €	
1.3.6. validation test								
1.3.6.1. test vehicle selection								
1.3.6.2. procure vehicles					30'000 €			
1.3.6.3. testing	50'000 €	320		10 vehicles, 10 tests, 3 weeks	150'000 €	1600	160'000 €	
1.3.7. modify								
<b>1.4. MAC</b>								
1.4.1. MAC fundamental-Works								
1.4.1.1. EU								
1.4.1.2. Japan (2010 -)								
1.4.1.3. USA (SC03)								
1.4.2. MAC Evaluation procedure								
1.4.2.1. comparison test method								
1.4.2.1.1. full environmental cell	150'000 €	500	50'000 €	5 vehicles, 6 tests, 2 weeks	307000 €			
1.4.2.1.2. AC component evaluation				50 components, 1 per day	125'000 €	240	24'000 €	
1.4.2.1.3. AC system evaluation				10 components, 1 per day	25'000 €	80	8'000 €	
1.4.2.1.4. simulation					700'000 €			
1.4.2.1.5. appropriate investment								
1.4.2.1.6. influence on emissions and fuel consumption	100'000 €	500	50'000 €					
1.4.2.2. develop test procedure		500			100'000 €			
1.4.2.3. validation test	50'000 €	320	32'000 €	3 vehicles, 6 tests, complex tests (as evap)	123'000 €			
1.4.2.4. OBD impact				1 vehicle, 3 tests	4'600 €	40	4'000 €	
1.4.2.5. modify								
1.5. gtr I Text development		1'600	160'000 €					
1.5.1. informal gtr I text								
1.5.2. formal gtr I text								
1.6. impact assessment								
<b>2. Phase II</b>								
<b>2.1. OBD</b>								
2.1.1. evaluation of existing regulations								
2.1.2. text development								
2.1.2.1. OBD specific definitions								
2.1.2.2. purpose and limitation								
2.1.2.3. monitoring requirements								
2.1.2.4. demonstration								
2.1.2.5.information								
2.1.3. validation								
2.1.3.1. procure test vehicles								
2.1.3.2. validation on test bench					1'202'000 €			
2.1.3.3. in-field validation				20 weeks, 10 vehicles	200'000 €	320	32'000 €	
<b>2.2. Low ambient temperature</b>								

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	Cost	Manpower	Manpower cost	assumption	costs	manpower	manpower costs	Comments
2.2.1. set test condition								
2.2.2. define fuel specification								
2.2.3. validation				5 vehicles, 3 tests, 1 temp	36'300 €	80	8'000 €	
<b>2.3. High altitude</b>								
2.3.1. set test condition								
2.3.2. define fuel specification								
2.3.3. validation				5 vehicles, 3 tests, 1 press	36'300 €	80	8'000 €	
<b>2.4. Durability</b>								
2.4.1. whole vehicle durability								
2.4.1.1. review current and new WLTP cycle (develop durability driving cycle)								
2.4.1.2. test points								
2.4.1.3. test fuel								
2.4.2. bench ageing tests								
2.4.2.1. define emission control parts								
2.4.2.2. develop bench ageing method								
2.4.2.3. test fuel								
2.4.3. develop test procedure								
2.4.4. validation								
2.4.4.1. bench tests					600'000 €			
2.4.4.2. road/chassis dyno					1'600'000 €			
2.4.5. assigned DFs								
2.4.6. modify								
<b>2.5. ISC</b>								
2.5.1. vehicle selection criteria								
2.5.1.1. define engine family								
2.5.1.2. rejection criteria								
2.5.1.3. number of test vehicles								
2.5.1.4. odometer criteria								
2.5.2. in service testing								
2.5.2.1. as received condition								
2.5.2.2. OBD information								
2.5.2.3. conduct maintenance if necessary								
2.5.2.4. second test if necessary								
2.5.2.5. measured emission constituents (tailpipe, CO2, Evap., ...)								
2.5.2.6. test fuels								
2.5.3. pass/fail judgement								
2.5.3.1. number of sample								
2.5.3.2. engine family								
2.5.4. modify								
2.6. gtr text Phase II								
2.6.1. informal texts (emissions & OBD)								
2.6.2. formal texts								
2.6.3. impact assessment								
<b>3. Phase III</b>								
3.1. define reference fuel specifications								
<b>3.2. Correlation testing</b>								
3.2.1. specify test vehicles				10 vehicles, 3 tests, 4 cycles + cold + high + evap + OCE				

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	Cost	Manpower	Manpower cost	assumption	costs	manpower	manpower costs	Comments
3.2.2. procure test vehicles					200'000 €			
3.2.3. comparative testing				20 weeks	1'620'000 €			
3.3. definition of emissions limits & OBD thresholds								
3.4. final gtr text								
3.5. impact assessment								
Phase I	2'828'400 €			Phase I	3'093'800 €	17200	1'600'000 €	4'693'800 €
Phase II	0 €			Phase II	3'674'600 €	480	48'000 €	3'722'600 €
Phase III	0 €			Phase III	1'820'000 €	0	0 €	1'820'000 €
Total	2'828'400 €	0 €		Total	8'588'400 €	17680	1'648'000 €	
				Total Project Cost	10'236'400 €			