TURNING UP THE HEAT

A Hotter India Demands a Smarter BS7

Aligning evaporative emission standards with real-world conditions

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Evaporative emissions: the pollution you can't see

Every petrol vehicle releases fuel vapour while it's parked. Heat makes it much worse.

Smog precursors

VOCs react with NOx and sunlight to form ground-level ozone and secondary PM2.5.

Toxic air pollutants

Petrol vapour contains benzene, which IARC classifies as carcinogenic to humans.

Fuel that's wasted

Every gram that evaporates is fuel the consumer bought but never used.

In India, 35°C isn't an extreme. It's a routine summer day.

100+

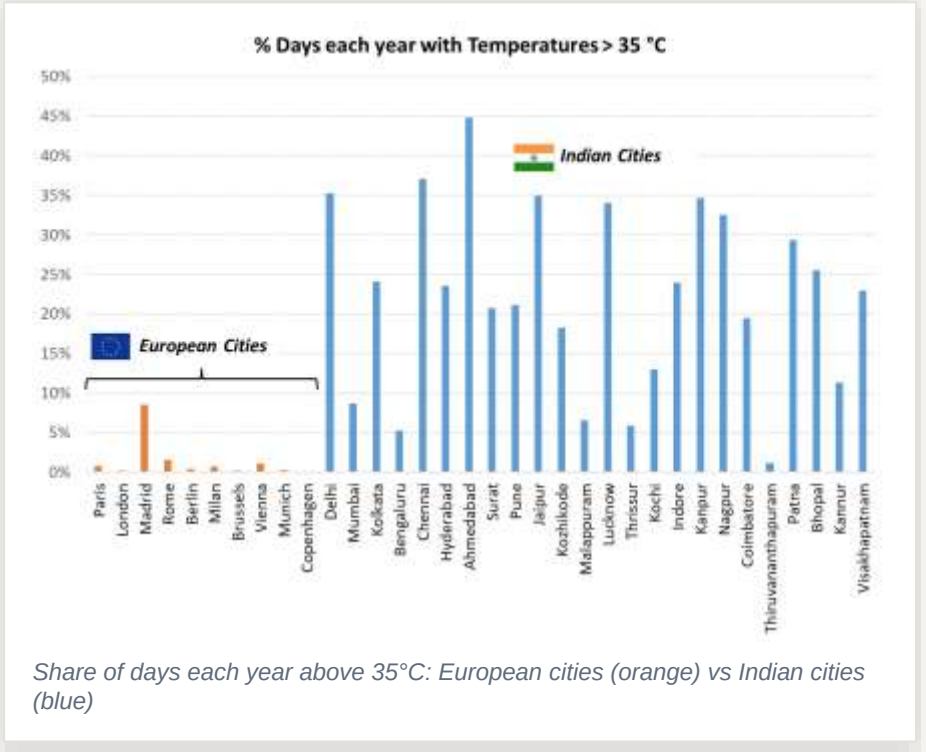
days a year above 35°C in many large Indian cities. Most EU cities see fewer than 5% of days above 35°C

53–60

days a year at or above 40°C in Ahmedabad, up from about 35 in the 1990s

~200

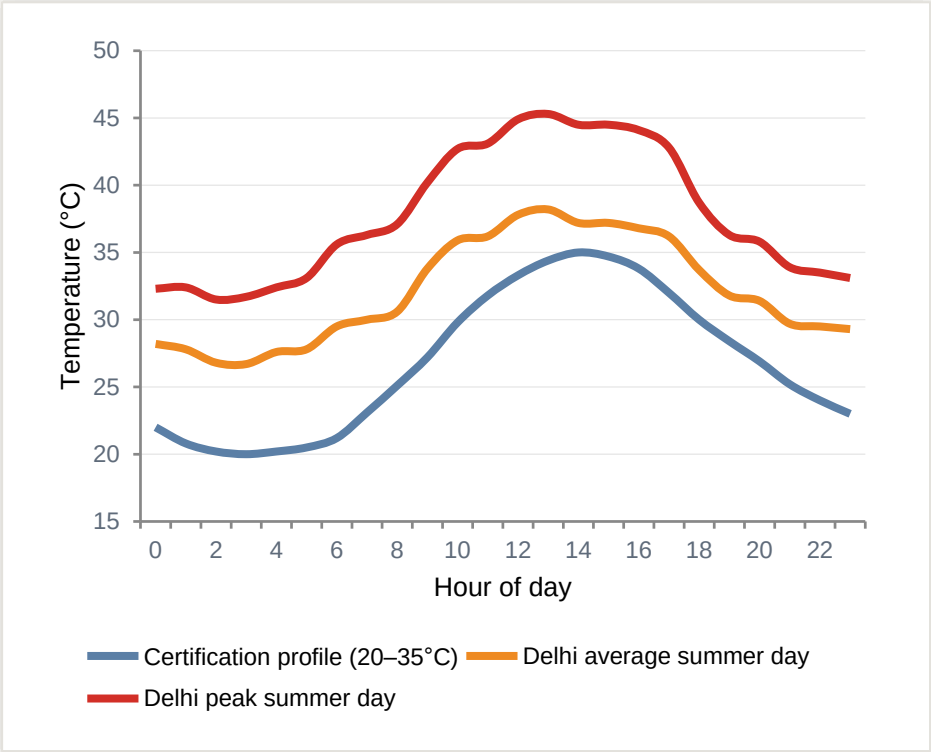
heatwave days nationally in 2024, vs. a 2010–2024 average of about 131



Share of days each year above 35°C: European cities (orange) vs Indian cities (blue)

Sources: India Meteorological Department; Times of India; Statista (as cited in ECMA/MECA technical policy brief)

Today's certification test reflects a European summer, not an Indian one

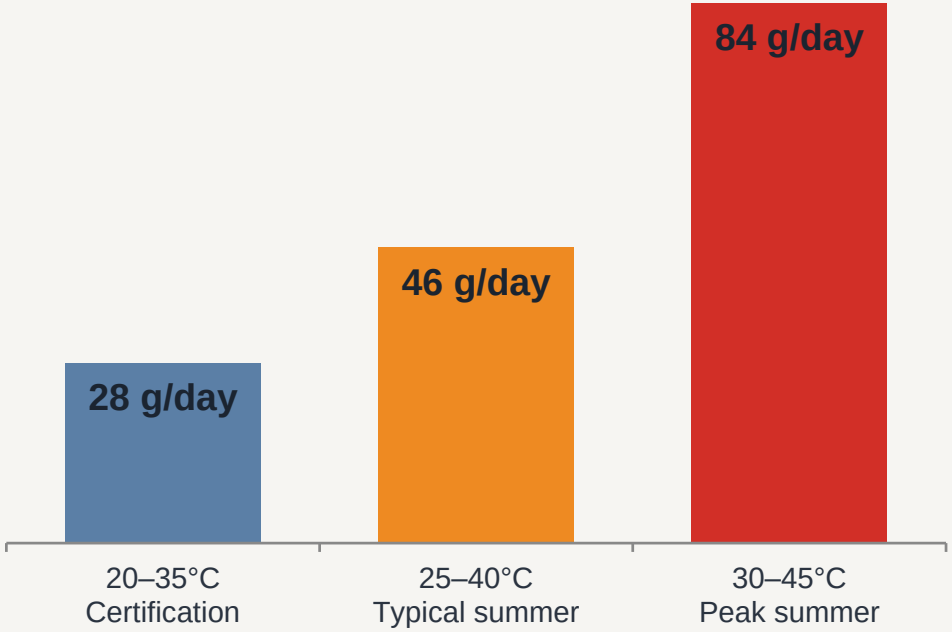


- The BS6 and proposed BS7 Type IV test uses a 20–35°C diurnal profile carried over from European procedures.
- On an average summer day, Delhi stays near 40°C for several hours. Fuel tank temperatures can be even warmer than ambient.
- Peak summer days reach 45°C, 10°C hotter than the test.

Vehicles are certified under conditions that are commonly exceeded in an Indian summer.

Fuel-tank vapour generation increases exponentially with temperature

Model simulated uncontrolled tank vapour generation:
50 L tank, 40% full, 63 kPa E20 fuel



Tank heats up

Fuel warms by day; vapour pressure climbs

Vapour builds

The canister must adsorb all of it while parked

Breakthrough

Once working capacity is exceeded, hydrocarbons escape

A first-of-its-kind study: full-vehicle SHED testing on three continents supported by ECMA and MECA

INDIA · ARAI

BS6 vehicle

1.5 L MPi · 50 L tank
1.0 L canister · E20 fuel (62 kPa)

EUROPE · IDIADA

Euro 6e vehicle

1.2 L MHEV · 44 L tank
1.06 L canister · E10 fuel (62 kPa)

UNITED STATES · ROUSH

Tier 3 / LEV III vehicle

1.5 L MPi · 50 L tank
2.3 L canister · E10 fuel (62 kPa)

Protocol: AIS-175 hot soak + 48-hour diurnal · fuels matched at ~62 kPa RVP · vehicles inspected and leak-checked, quantify evaporative emissions at 3 different temperature profiles.

20–35°C	25–40°C	30–45°C
Certification	Typical summer	Peak summer

+5°C means 6× more emissions. +10°C means 39× more.

1.36 g

Certification (20–35°C)

Passes the 2.0 g/test limit

8.35 g

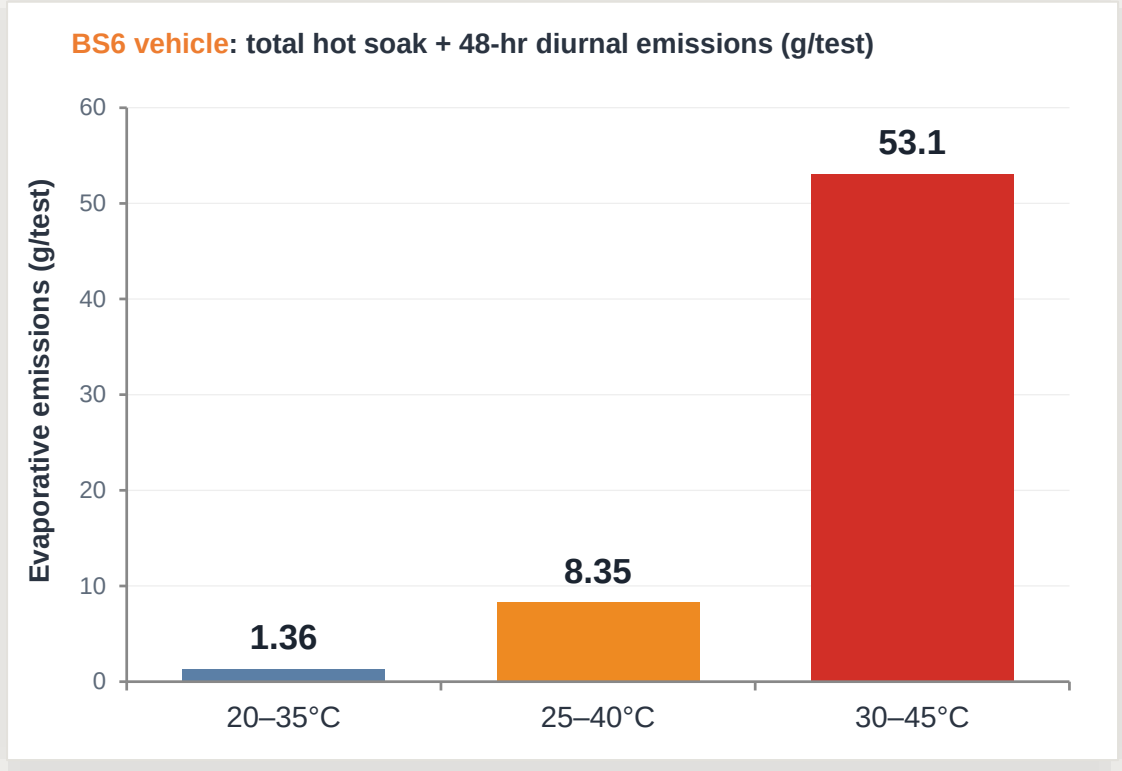
Typical summer (25–40°C)

6× higher; 4× over the limit

53.1 g

Peak summer (30–45°C)

39× higher; 27× over the limit



In India summer, evaporative emissions far exceed tailpipe hydrocarbons

4.5 g

Tailpipe NMHC over 2 days of driving

BS6 limit 68 mg/km × 33 km/day × 2 days

Tailpipe hydrocarbons are tightly regulated. In the heat, a parked vehicle can emit far more.

53.1 g

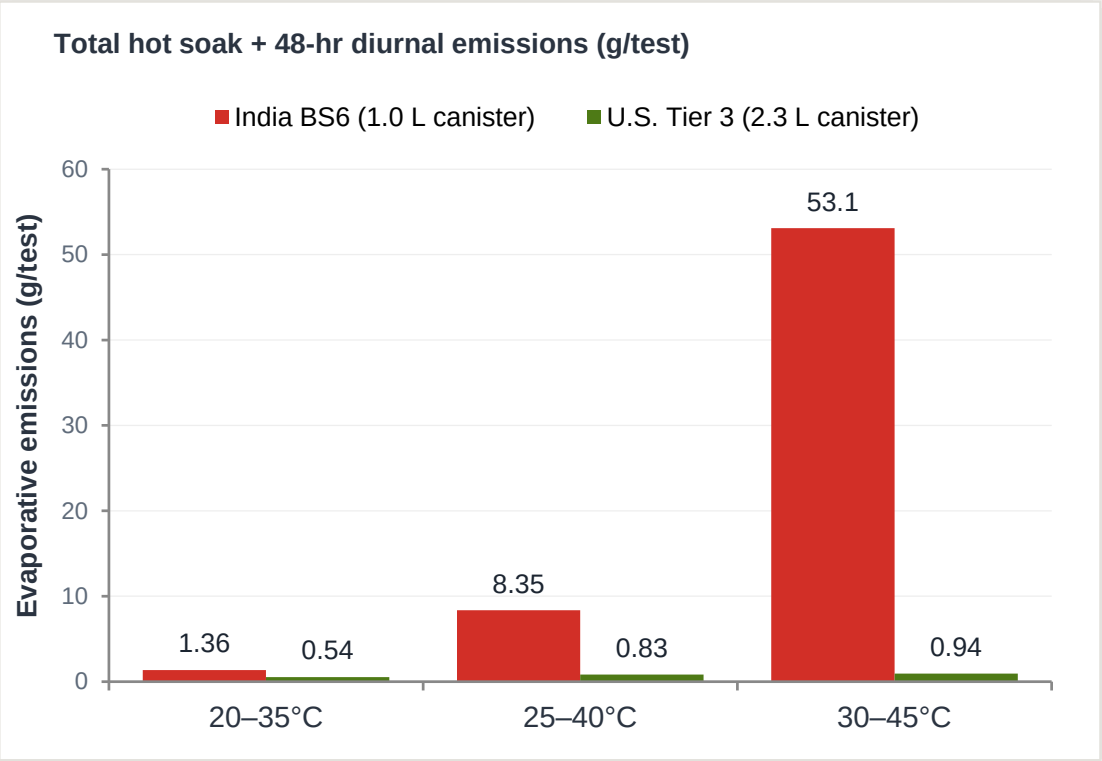
Evaporative emissions over 2 days parked

BS6 vehicle, 30–45°C diurnal profile

~12× the tailpipe amount

In India summer, a car parked for just two days can pollute as much as three weeks of driving.

The fix already exists: a larger canister keeps emissions under 1 g, even at 45°C



~1 L

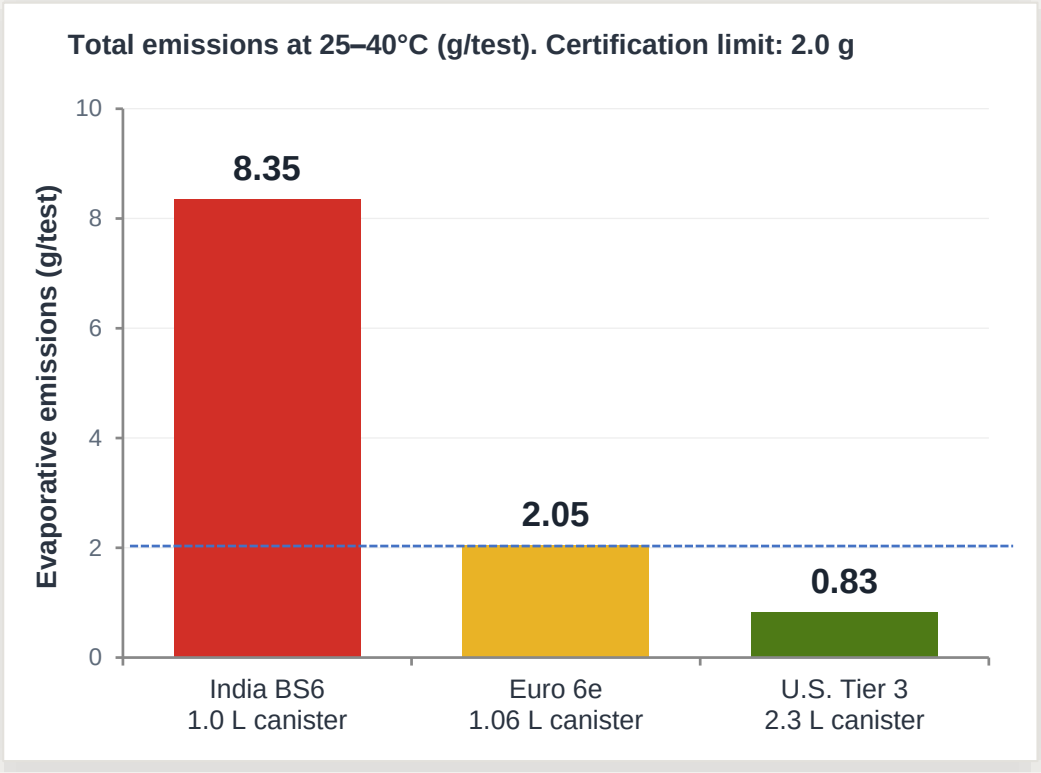
2.0+ L

Illustrative canister sizes

90–98%

lower emissions at Indian summer temperatures, using proven technology already adopted in the U.S., China and Brazil

System design matters, but even better-optimized 1 L systems exceed limits in the heat



Key design levers

Canister volume

Twice the volume gives the most headroom

Activated-carbon working capacity

Higher-capacity carbon holds more vapour before breakthrough

Fuel-tank material

Metal tanks heat faster than plastic tanks

Purge calibration

Restores canister capacity between parking events

The Euro 6e vehicle still exceeded 2.0 g at 25–40°C.

Euro 7 limit is 1.5 g

Leading markets outside of Europe and India have implemented robust evaporative standards

Standard	India BS6, Phase III	Euro 7 (final)	Brazil PL7	China 6b	China 7 (proposal)	U.S. Tier 3
Evaporative / parking	2-day 2.0 g	2-day 1.5 g	2-day 0.50 g	2-day 0.70 g	2-day 0.35 g	**3-day 0.30 g**
Refuelling (ORVR)	None	None	0.05 g/L	0.05 g/L	0.05 g/L	**0.05 g/L**

Standards designed for ozone season

U.S. EPA sets evaporative standards for "ozone-prone summertime conditions," including two or more days of non-use. CARB's diurnal profile reaches 41°C.

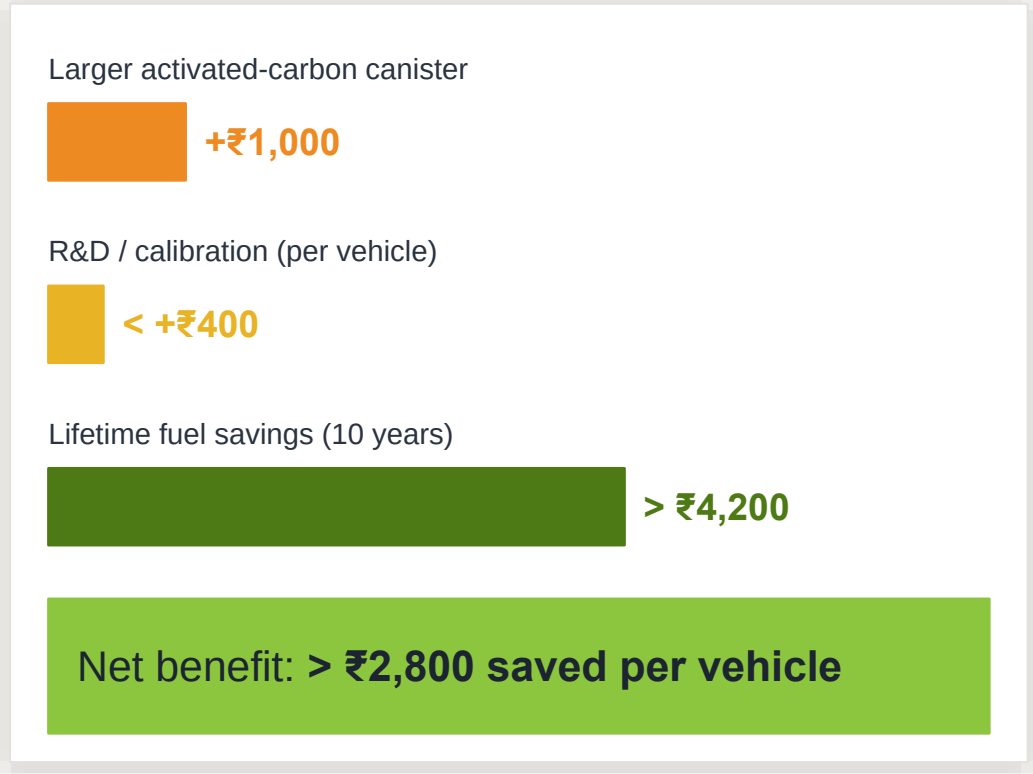
The Dieselgate lesson

Passing a lab test doesn't guarantee real-world performance. RDE fixed this for the tailpipe. For evaporative emissions the fix is even simpler: update the temperature in the existing test to reflect temperatures vehicles actually experience.

Why follow European evaporative emission requirements that no longer represent global best practice?

Why test vehicles using European temperature profiles when Indian vehicles operate in much hotter conditions?

Low cost to implement, and consumers come out ahead



4.2 L

of petrol kept in the tank per vehicle

No new SHEDs

Existing chambers need only a software change to run the new profile

No new hardware

Tank, valves and hoses are unchanged from BS6 Phase III

Existing canisters can be optimized

Basis: EC Euro 7 technical study canister cost (~€10/unit); 8.5 g/day recovered × 365 days = 4.2 L/yr × 10 yrs × ₹100/L

Better evaporative control builds on India's existing vapour-control policy

Already underway

The Supreme Court directed Vapour Recovery Systems (VRS) at major petrol outlets. CPCB identifies refuelling stations as significant sources of benzene and VOCs.

The remaining gap

Parked vehicles release the same petrol vapours, including benzene, and emissions spike in hot weather. Currently proposed BS7 test conditions (AIS-215) leave these emissions largely uncontrolled.

Next opportunity: ORVR

Station VRS efficiency can fall to < 50% efficiency in use. On-board refuelling vapour recovery achieves 98% efficiency and is already required in the U.S., China and Brazil.

Updating AIS-215 is an easy solution that will extend vapour control from the petrol pump to the parked vehicle. This ensures evaporative emissions from E20 and higher blends are controlled.

OUR RECOMMENDATION FOR BS7

Adopt a 48-hour, 25–40°C diurnal test in AIS-215 for all vehicles running on petrol (2W and 4W)

Representative

Reflects typical Indian summer conditions, as AISC's mandate to consider Indian conditions requires

Practical

Same procedure and same SHEDs, with only the temperature profile updated

Proven

Existing technology cuts emissions by more than 90% at Indian temperatures

A triple win for India

Lower emissions. Cleaner air. Less fuel lost.

Thank you | Dr. Terry Lathem · Terry.Lathem@ingevity.com

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ECMA
Clean Air Today, Cleaner Air Tomorrow

MECA
SUPPLYING CLEAN MOBILITY

Supplemental Slides

Figure 2: Vehicle A tested at ARAI in India

Figure 3: Vehicle B tested at IDIADA in Spain

Figure 4: Vehicle C tested at Roush in U.S.

Table 1: Vehicle specifications

Specification	Vehicle A	Vehicle B	Vehicle C
Test region / laboratory	India, ARAI	Europe, IDIADA Spain	United States, Roush
Model year	2024	2026	2026
Certification	BS6	Euro 6e	Tier 3 / LEV III
Powertrain	1.5 L MPi	1.2 L mild hybrid, MHEV	1.5 L MPi
Fuel-tank capacity	50 L	44 L	50 L
Carbon-canister volume	1.0 L	1.06 L	2.3 L
Vehicle mileage	9,600 km	7,400 km	5,400 km
Test fuel	E20	E10	E10
Measured fuel RVP	62.5 kPa	62 kPa	62.0 kPa
Preconditioning cycle	WLTP	WLTP	FTP-75
Diurnal test duration	48 hours	48 hours	48 hours
Temperature profiles tested	20–35°C; 25–40°C; 30–45°C	25–40°C	20–35°C; 25–40°C; 30–45°C

Larger canisters (2.0L+) were estimated by European Commission to cost 10€/unit (₹1000) in the Euro 7 proposal

Table 9-5: Cost of evaporation control technologies

Component	Unit (cost per)	Cost (€)
ORVR carbon canister for 0.5g/test	New registration	10
Anti spitback/vapour seal valve	New registration	2
Purge valve	New registration	2
Tank vent hose	New registration	2
Larger ORVR carbon canister for 0.3g/test	New registration	4
Low permeability tank and hoses	New registration	20
Pump system for OBD leak check	New registration	25
R&D/calibration/engineering costs	Engine/model family	1 000 000
Certification / Admin costs	New registration	0.2

ORVR canisters are 2.0L+, so this cost is appropriate to estimate costs of ECMA's proposal

These costs are not applicable as BS6 vehicles already have purge valves and tank vent hoses

These costs are not applicable to the final Euro 7, which did not include the lower emission limits down to 0.3 g/test

R&D and calibration costs are per Type approval and must be divided by total projected vehicle sales for the type approval, which can be several hundred thousand units

Technical studies for the development of Euro 7 - Publications Office of the EU