Regenerative Braking Energy Recovered

Kinetic energy released when a vehicle slows, the energy recovered by regenerative braking and the extra driving range it gives at a given consumption.

Method: Kinetic energy recovery in braking

Input parameters

Unit system: SI

Parameter	Value	Unit
Vehicle mass	1,800.0	kg
Initial speed	80.000	km/h
Final speed	0	km/h
Regeneration efficiency (wheel to battery)	65.000	%
Driving consumption	160.00	Wh/km

Calculated results

Parameter	Value	Unit
Kinetic energy released	123.46	Wh
Energy recovered to the battery	80.247	Wh
Extra range from the recovered energy	0.50154	km

Notes for this case

• ΔKE = ½m(v₁² − v₂²); rolling resistance and drag also slow the car, so the energy actually available at the wheels is somewhat less in gentle braking. Recovery is limited by motor and battery power and by stability (front/rear braking split).

Formula and method

$$\Delta KE = \frac{1}{2} m \left(v_1^2 - v_2^2 \right), \quad E_r = \eta_r \Delta KE$$

Variables

m	Vehicle mass	kg
v_1	Initial speed	m/s
v_2	Final speed	m/s
η_r	Regeneration efficiency (wheel to battery)	-
e	Driving consumption	J/m
ΔKE	Kinetic energy released	J
E_r	Energy recovered to the battery	J
Δs	Extra range from the recovered energy	m

Method and standards

Regenerative braking.

Assumptions and limits

- Level road; aerodynamic and rolling losses ignored.

References

Kinetic energy recovery in braking

Report details

Report reference	FCC-2KEH-1RAP (the same inputs always give the same reference)
Generated	23 November 2026, 18:09 UTC
Calculator	Regenerative Braking Energy Recovered
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/automotive/electric-vehicles/regenerative-braking-energy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.