

WORK-ENERGY-POWER

Unit 10 & 11 Dr. John P. Cise, Professor of

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An Event That Is Truly Electric: Formula E to Race in Brooklyn



The single-seat Formula E cars that will race next July at the Brooklyn Cruise Terminal resemble Formula One cars.

INTRODUCTION: Wikipedia states these Formula E cars have 250 HP and go 0 – 62 mph in 3 s. Google site Gives their weight at 1980 lb. The objective of this application is to confirm the very high efficiency of 59 to 62 % for electric cars. $P(\text{OUTPUT}) = W(\text{OUTPUT})/t$ where output work goes to cars kinetic energy $K = \frac{1}{2} m v^2$. $X = \text{car efficiency} = P(\text{OUTPUT})/P(\text{INPUT})$. Thus, $X P(\text{INPUT}) = P(\text{OUTPUT})$

$$X P(\text{INPUT}) = \frac{1}{2} m v^2 / t \quad \text{eq. 1}$$

At the US Government site (fuelconomy.gov) it is said....."Electric vehicles convert about 59% to 62% of Electric energy from the grid to power at the wheels."

QUESTIONS: (a) Convert 250 HP to ft. lb./s. ?, (b) Find mass in slugs of this formula E car?, (c) Convert 62 mph to ft./s. ?, (d) Find efficiency X?,(e)Compare with gov. #?

The New York area is home to the Yankees and the Knicks, the [Belmont Stakes](#) and the [Westminster Kennel Club Dog Show](#). But the city that is the capital for so many sports has hardly been a center for auto racing.

"The world has been trying for years to race in New York City, and it has never been possible," said Alejandro Agag, the chief executive of Formula E. "Everyone has been trying to race in New York City. Formula One, everyone. New York is the capital of the world. We are really over the moon." The city and Formula E announced the races at a news conference on Wednesday afternoon. The races will be held on a Saturday and Sunday to be determined in late July as part of the circuit's third season. The course will be laid out at the [Brooklyn Cruise Terminal](#) in Red Hook.

The cars do not look like the Volt or Prius you were stuck behind yesterday on the freeway. They are single-seaters that to an untrained eye could pass for the rides of Marco Andretti or Lewis Hamilton.

The cars race like that, too. In a straight, they can reach 180 miles an hour, Agag said, but in a race over a twisty road-style course, they top out around 150 m.p.h.

HINTS: 1 HP = 550 ft. lb./s. , Weight = (mass)x(gravity), $W = m g$, $g = 32 \text{ ft./s.}^2$, 88 ft./s. = 60 mph,

ANSWERS: (a) 137,500 ft. lb./s., (b) 61.875 slugs, (c) 90.033 ft./s., (d) $X = \text{efficiency} = 0.61$ or 61 %

(e)**COMMENT:** Amazing how the computed efficiency compares so well to fuelconomy.gov sited efficiency. The chevy volt , all electric, has a 60% efficiency rating also. 60% efficiency is common to all 100% electric cars. Dr. Cise