WORK-ENERGY-POWER
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Buick Envision, a Crossover With a Chinese Heritage

THE new **Buick Envision** might seem like any other two-row crossover sport utility vehicle available in the United States, but for a crucial distinction. It is the first mainstream vehicle to **come to this country from China**. **Although designed and engineered in America, Envision is assembled in China.** Buick is exceedingly popular in China. Elite leaders of the past, including Pu Yi, Sun Yat-sen and Zhou Enlai, were driven in American-made Buicks. That pedigree (and the shabby quality of domestic Chinese cars in the past) catapulted the mark to great success in China. Although a limited number of 2016-model Envisions from China were quietly introduced a few months ago, it is with the 2017 models that Buick is playing up the vehicle's American market entry. In addition to **(((252 horsepower)))** and 260 pound feet of torque, the **Envision's turbo models receive G.M.'s HiPer Strut front suspension** and an upgraded all-wheel-drive system that employs torque vectoring in the rear for better traction. In a hurry? **(((Go with the turbo. With 0-60 runs in the 8-second)))** range, pep is respectable. This year, **Consumer Reports rates Buick third in reliability after Lexus and Toyota.** The Envision starts at $35,000 for a base front-drive model. My Premium example stickers for about $44,000, on par with the competition. In China, G.M. is on pace to sell 200,000 Envisions this year.

INTRODUCTION: This 2017 Buick Envision turbo engine output power(P_{OUT}) goes into doing (output work/unit time) where W_{OUT} = Useful kinetic energy = $\frac{1}{2}\, m\, v^2$. Thus $P_{OUT} = \frac{1}{2}\, m\, v^2/t$

X = efficiency = P_{OUT}/P_{input} ,

$$P_{OUTPUT} = x\, P_{INPUT} = \tfrac{1}{2}\, m\, v^2/t$$

Wikipedia: Weight of Envision is listed as 3919 lb.

QUESTIONS: (a) Find mass(in units of slugs) of Envision? (b) Convert Envision HP to ft. lb./s.? (c) Find efficiency X of Envision ?

HINTS: Wt. = m g , g = 32 ft./s.^{2} , 550 ft. lb./s. = 1 HP, 60 mph = 88 ft./s.

ANSWERS: (a) 122.47 slugs , (b) 138,600 ft. lb./s., (c) ~42.8 %

COMMENT: Being a turbo, we should expect > 40% efficiency.