EAA Chapter 639 - HMB Pilots Newsletter

February 2024

CMDR Dick Martin Launches for a Night Mission to Hanoi in 1970

In this edition:

February/March 2025 - Message from the Board

February saw great progress with our 501c3 status being finalized by both State and Federal agencies, just in time for scholarship fundraising activities at the 2025 Pacific Coast Dream Machines!

This year's Dream Machines event is shaping up to be a lot of fun and we hope to see you there. A fun way to help is volunteering with a friend in our Tri-tip booth, or in the Aviation Display area. Hope you can make it!
Other Business:
Board Zoom Meeting was held on March 14th which was open to Chapter Members. During the meeting where the following items were voted on:

- Chapter Dues for both Individuals and Families will be $40 per calendar year
- A small budget has been approved for meeting refreshments.
- Additional ideas for tenant aircraft in the Aircraft Display area for PCDM were proposed - Craig Meyers, Bill or Marian may reach out soon to tenants, and let us know if you'd like to put your aircraft in the Display Area

Upcoming Activities

Friday, March 21, at 6PM: Chapter Meetup at the Pilot Light Cafe

April 27 2025: Pacific Coast Dream Machines,

Join us this year! Our plans:

- Glenn and Nancy Reynolds will host the famous Tri-tip Sandwich booth
- Craig Meyer will be coordinating help with transient parking and tenant aircraft displays
- Ed Andreini has recruited cool warbirds for display (Mustangs and C-4, Yak 9 and 11 and more!)

Saturday, May 10: Young Eagles

Interested in helping get the next generation of pilots hooked on aviation? Let us know if you want to get involved, email us ASAP if you can help!

Community spotlights

One-year Anniversary

Congrats to Liam Scott-Montcrieff who got his PPL last Feb, 2024. Due to the lack of examiners, he and Glenn flew up to Alaska for his checkride. Where is his coat, hat and arctic gloves?? Don't ask me…

Working hard at United

Nealan Lamprecht is working hard at his internship in Denver Colorado for a 3-month flight-ops internship. Congrats on a major milestone!

RNAV 30 Approach in Byran F's new Maule

Ross F and Kamryn L practice the RNAV 30 approach into KHAF in Bryan's Maule.

Locals Appreciation Days at Pilot Light

January 13, 2025 – April 18, 2025

Warm up this winter with a $4 discount on a different item each (non-holiday) weekday:

Mondays
$13 Classic breakfast combo

Tuesdays
$14 Breakfast burrito

Wednesdays
$17 Sweet Dutch baby
$18 Savory Dutch baby

Thursdays
$17 Fish and chips

Fridays
$14 Hundred dollar cheeseburger

No substitutions. Offer not available on January 20 or February 17.

PILOT LIGHT Cafe

Horsepower to Housepower - Chinmay Patel

We have been discussing transportation efficiency in past HMB Airport Pilot Association newsletters. In the first of my articles in the series, we identified that we often trade efficiency for speed in transportation [1]. We also learned how to drive/fly optimally, and that higher speed comes at the cost of higher energy usage.

In the second article, we saw how efficiency alone may not lead to energy conservation when the total energy usage by all users is taken into account [2]. We made a case for keeping efficiency as a priority and what factors help to make conservation possible.

But how do we know what our activities cost? Now continuing the series in the EAA Chapter Newsletter, It is quite difficult to get a feel for how much we consume and how fast we spend energy. We use Calories for the energy in food, BTUs or kilo-Watt-hours (kWh) for utilities, and gallons for fuel. Power is the rate at which energy is used, and it is measured as horsepower (hp) for cars, or Watts or kilo-Watts (kW) for bulbs and appliances. Power is measured in kW and energy in kWh. Schools and colleges do talk about these units, but I doubt if we learn to juggle these units with ease. To add to the fog, I have certainly slept through classes at times. Engineers and pilots speak about power and energy, often correctly, but the problem of conveying the “feel” of energy usage is hard when the general population over the world is considered. Let’s take a stab at it here.

In these articles, we have been focusing on awareness of energy use so as to stay away from the conservation debate. We allow ourselves to splurge, be wasteful, or have fun, but know that there’s a cost-benefit trade-off for every activity.

We just want to understand enough to figure out what the trade-offs in different activities are. Better than living a life in IMC!

So, humor me in this article as I propose the notion of "Housepower" and compare it to horsepower. US-housepower to be exact, as Imperial-housepower is different! We've already run into a units debacle, but bear with me as I share the details. I am reasonably sure some of you will come up with a better idea for comparison, and that's the whole point of the article. Let's talk about some basics...

The average US household used 77 million BTUs in 2015 according to a US Dept. of Energy FAQ [3]. Considering that about 3412 BTUs make 1 kWh, we can say the average US household consumes 22,566 kWh per year. Divide that by 365*24 = 8760 hours to get an average power level of 2.6 kW (3.5 hp) for the average US household, including electricity and gas. Remember this number; we'll use it in a bit. The average US household consumes 2.6 kW*24 h = 62 kWh in a day. Now you can compare that to an EV battery!

Regular unleaded gasoline provides 114,100 BTU/gallon or 33.44 kWh/gal. Similarly, Jet A provides roughly 37 kWh/gal [4]. So, 1 gal/h of gasoline provides about 33 kW for an hour and Jet A provides about 37 kW. 100 LL is similar to gasoline with about 33 kWh/gal [5].

You can see where this is headed! I am going to compare everything to the 2.6 kW power level of a household. The public will find it easy to think about how many households can a gallon of gasoline power for an hour (assuming no losses), I surmise. The answer is 33 kW/2.6 kW or about 13 households. You can look at your neighborhood and get a feel for it. We are certainly assuming your neighborhood is an average US neighborhood, but broad strokes will do for this discussion.

We forgot horsepower specs of cars, I guess. 1 kW is about 1.34 hp. Therefore, a 100 hp car is equivalent to 74.6 kW, or about 746 100-Watt bulbs. See? We can now compare a car to a light bulb. That's progress, scientifically speaking!

Knowing all this, let me ask you a couple of questions: How do your activities compare to an average US household? How many houses can you power as you drive on the freeway, fly in your airplane or in an airliner? Interesting questions, aren't they? I am guessing you will be filled with gratitude once you finish reading this article. We are a lucky bunch!

We can put all the above ideas in a blender and come up with the table below:

Vehicle	Consumption rate	Power level (from fuel or batteries)	Equiv. US households	Remarks
KIS-TR1 2-seat airplane	5.5 gal/h at 130 KTAS	184 kW (247 hp)	71	Most GA airplanes do worse, Your Honor!
2010 Toyota Prius	48 mpg or ~1.5 gal/h at 70 mph	50 kW (67 hp)	19	That's how many houses are lighting up when I drive on the freeway.
Tesla Model 3	241 Wh/mi, 70 mph	17 kW (23 hp)	6.5	About 3 times better than my Prius.
Pipistrel Alpha Electro (2 seat electric airplane)	18 kW at 75 kts (Cruise only, more power in climb).	18 kW (24 hp)	7	Hey! This airplane is like a Tesla Model 3 in cruise, only faster.
Yak-52	Assuming 25 gal/h	825 kW (1106 hp)	317	Much of the 1106 hp is lost on its way to creating thrust.
P-51 Mustang	Assuming 70 gal/h	2341 kW (3139 hp)	900	Ditto!
Boeing 787-9	20 lb/mi for 4972 nmi, 567 mph, 15,506 gal, 304 passengers [6].	61,679 kW (82,713 hp)	23,273	A350-Neo is similar.
Airbus A380	48.9 lb/mi for 6000 nmi, 652 mph, 49,655 gal, 544 passengers [6].	173,324 kW (232,431 hp)	66,663	Mountain View, CA has ~33,760 households! [7].
Gulfstream G550	Say, 560 gal/hr [6] and 19 passengers.	20,720 kW (27,785 hp)	7,969	Per-seat consumption is much higher than an airliner.
R44 helicopter (4 seats)	15 gal/h typical operations [8]	495 kW (663 hp)	190	Hover power is higher, around 228 households.
Human	Assuming a 2200 Cal per day diet. 860 Cal = 1 kWh.	106 W (0.14 hp)	0.041, ~24 bodies equal a household	Think of a person as a 100-Watt light bulb. Some are brighter than others!
US per-capita usage	Roughly 245 kWh/day	10.2 kW (14 hp)	4	Includes housing, transportation, food, recreation, etc.
Fighter jets, SpaceX rockets, Concorde	??	??	You help me!	Not a trivial pursuit, you will have to admit.

So, you can see now that a car that boasts 1000 installed hp (746 kW) can use up to 287 US households' worth of energy per second. How would you feel if 287 houses lost power as you drove by? Exhilarating, for sure! But the rush would stop when someone else drove by your house.

Cars do not need or use anywhere near that power in normal use, but the design tradeoffs needed for the extra horsepower stay with the car forever. Imagine carrying a hammer with you for your entire life hoping to use it someday. We wouldn't even question the norm if everyone carried their hammer all the time. It would feel normal.

Now to the discussion and caveats:

- We have talked about US-households since the local pilots would be most familiar with that notion. Countries around the world have consumption levels half or even a tenth of the per capita consumption in North America. Pick your favorite locale and use a factor to multiply the number of households accordingly. The numbers will generally get worse.

- The above table does not include the influence of speed, range, utility, and per-capita usage. Airliners are more efficient per-capita and much faster than a single-driver-in-car commute, but that is not reflected clearly in the above table. The KIS-TR1 takes 16 minutes for a trip that takes 50 minutes for the Prius, so the equivalent households are not being lit up for the same amount of time. A detailed analysis should choose the metric very carefully, and it becomes difficult to compare different modes of transportation or energy usage, in a general sense, in a short article. I hope to provide you with a feel for the numbers and the tools to compare “with reckless abandon” on your own!

- Indeed, human endeavors do take much more power than a household. There is nothing magical about using household power level as a benchmark, but it does provide a way to compare different activities to a basic necessity -- housing. Each activity has a cost and a benefit. The time has come to pay attention to the tradeoff. The tools to do so have existed for centuries.

- Transportation is expensive, and becomes more expensive as it gets faster. Although transportation of people and goods is a necessity, the costs of unnecessary, unplanned, or “un-smart” transportation are massive. Air-freight is super expensive compared to ocean-freight, although the speed is much faster.

- The above discussion assumes a constant power level throughout the day for a household. Personal transportation, for example, typically spans a few hours at most. So, this comparison only applies to vehicles when they are in use. I think it is still worth the effort.
- Electrical potential energy in batteries does not have to be converted into a flaming explosion of heat energy as done in an internal combustion engine. So, the heat losses are much lower and EVs are more efficient than gas-engine cars in terms of operational costs. If the overall energy costs over their life-cycle are managed well, EVs are the way to go. What holds them back technologically, for now, is the lack of energy and power density compared to gasoline.

- The more energy intense an activity is, the greater the thought put into its purpose should be. Mis-steps by a few, even occasional ones, can negate the conservation efforts of many. This is why it is important for everyone to have an intuitive feel for the
numbers.

- I have used broad strokes here. The idea of comparing the power level of different activities to household power level is useful to me, but the devil is in the details. We have discussed the connection between efficiency and total energy usage in a prior article [2].

So, as a recreational GA pilot, how on earth do I rationalize my way out of this guilt trip? Let me present an argument to justify my hedonism; I have no choice. Let’s say anatomically modern humans evolved half a million years ago [9]. In the cumulative human population that has ever

existed or, I suggest, ever will, we pilots are in a special alignment of circumstances. In the timeline of the human species, piloted flight (1903 onwards) will likely be a blink of an eye. Pilots are special amongst humans even within that blink.

Although the entire planet has been influenced by air travel, just an insignificant fraction of people have ever had the privilege of being a PIC. Automation has already taken over the air transport industry for the most part. Automation and AI are poised to vastly change the landscape of general aviation and automobiles as well, and rightfully so in some aspects. It is no longer clear whether human stick-and-rudder skills will be used in the decades to come. On a macro scale we are in an incredibly fortunate combination of circumstances to be able to fly as a PIC today.

I say we gratefully enjoy this alignment of stars we were born into. It is also imperative that we learn from this opportunity and make sure others today, and in the future, get to indulge like we do. An awareness of how our flying compares to other activities is a start in this journey to be a knowledgeable pilot.

Would you like to join me?

References:

[1] A Pilot's Guide to Buying Speed, HMBAPA Newsletter, Feb. 2019.
[2] Efficiency Schmefficiency, HMBAPA Newsletter, July 2020.
[3] https://rpsc.energy.gov/energy-data-facts
[4] https://en.wikipedia.org/wiki/Gasoline_gallon_equivalent
[5] https://www.warteraviation.com/wp-content/uploads/2018/04/AVGAS-100LL-Technical-specification.pdf
[6] https://en.wikipedia.org/wiki/Fuel_economy_in_aircraft
[7] https://www.census.gov/quickfacts/mountainviewcitycalifornia
[8] https://en.wikipedia.org/wiki/Robinson_R44
[9] https://en.wikipedia.org/wiki/Timeline_of_human_evolution

Mark your calendar!

List upcoming events, workshops, or training sessions. Include dates, important notes, and who to contact for more information.

Date	Event	Notes
March 14 @ 6PM	EAA Chapter Board Zoom Meeting	Current EAA Chapter members are welcome
March 21 @ 6PM	General Chapter Meeting	Pilot Light Cafe at Terminal Building

About us - The team

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