

Electric Bicycles

Sponsored by Alaska Center for Appropriate Technology (ACAT)

By Alan Mitchell

alan@analysisnorth.com

Presentation Available at: bit.ly/ebike-acat

April 22, 2020

Electric Bike, Energy Analysis

- Bicycle with Electric Motor and Battery
- Human Pedaling Power is about 100 Watts
 - Bike Racers are 300 W !
- My Ebike Battery+Motor: 450 Watt-hours of Mechanical Energy available.
 - Like another Person pedaling for 4.5 Hours
 - Or, a Bike Racer pedaling for 1.5 Hours
- The Helper adds about 30 pounds to Bike Weight!



My Motivation

- Live at 800' Elevation.
 - Climbing Back up the Hill deters me from Riding
- Replace Car Trips.
 - 60% of Car Trips in US are less than 6 miles
- Do Longer Trips, like I did 40 Years Ago
- In General: Ebike Improves Range, Speed and Hill Climbing of Standard Bike



Huge Sales Growth

- 70% growth in US between 2017 and 2018.
- 200 million Ebikes/Scooters in China.
As many as Cars.
- Deloitte says more Ebikes on road at end of Next Year than all other EVs



Road, Mountain, Folding, and Commuter Ebikes



Cargo Ebikes



Ebike Components

Motor



Battery



Display, Throttle, Charger



How Far and How Fast Can you Go?

- How Far

- How Hard are You Pedaling?
- How Fast do You Want to Go?
- How Hilly is the Terrain?

- How Fast

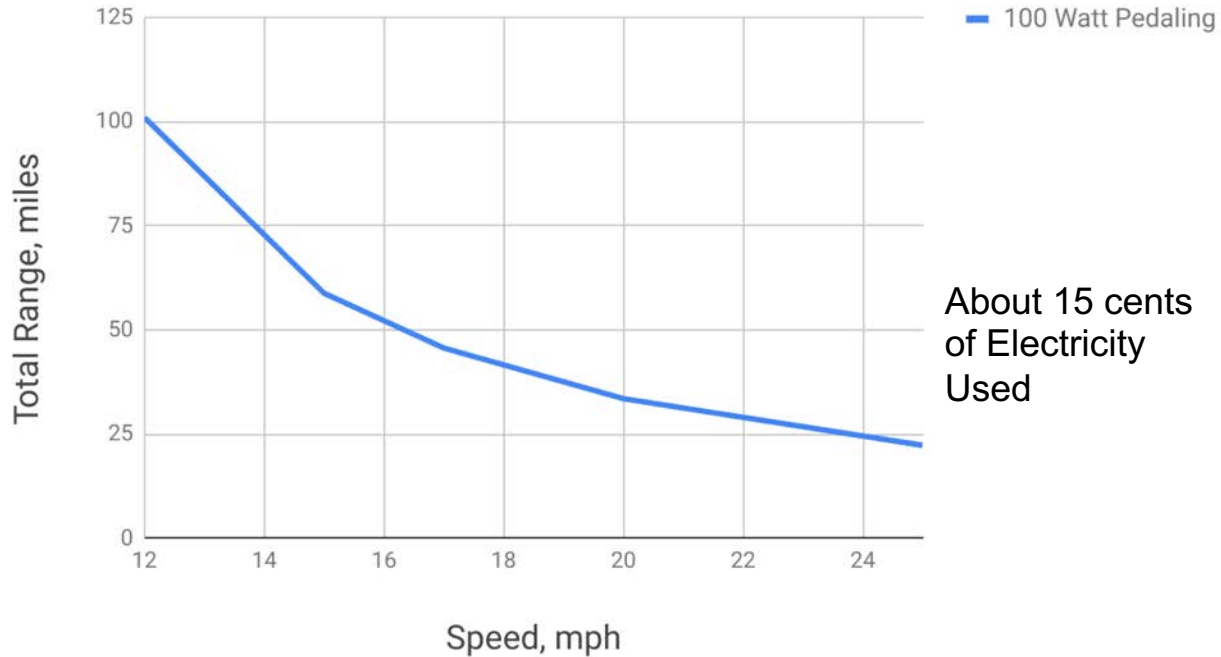
- 20 mph Motor Cut-out Required for Anchorage Bike Trail Use
- 28 mph with Hard Pedaling and Motor Assist

Range of Ride1Up 700 Ebike

Downtown Anchorage - Eagle River Terrain

<https://www.ebikes.ca/tools/trip-simulator.html>

Range on One Charge vs. Speed Traveled



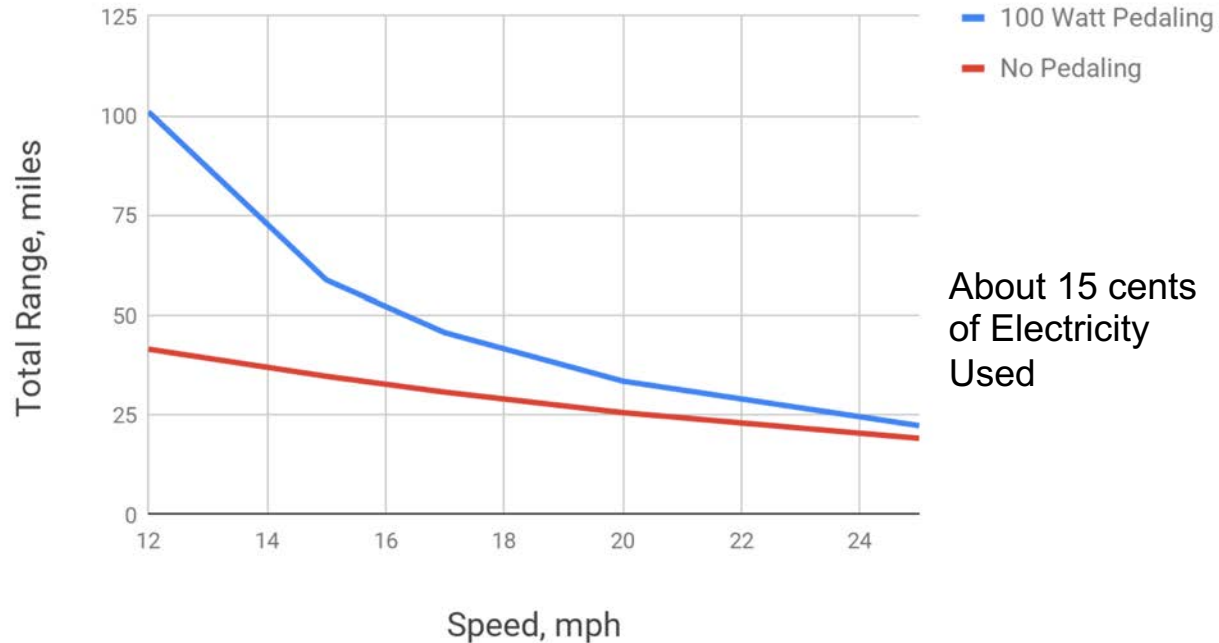
About 15 cents
of Electricity
Used

Range of Ride1Up 700 Ebike

Downtown Anchorage - Eagle River Terrain

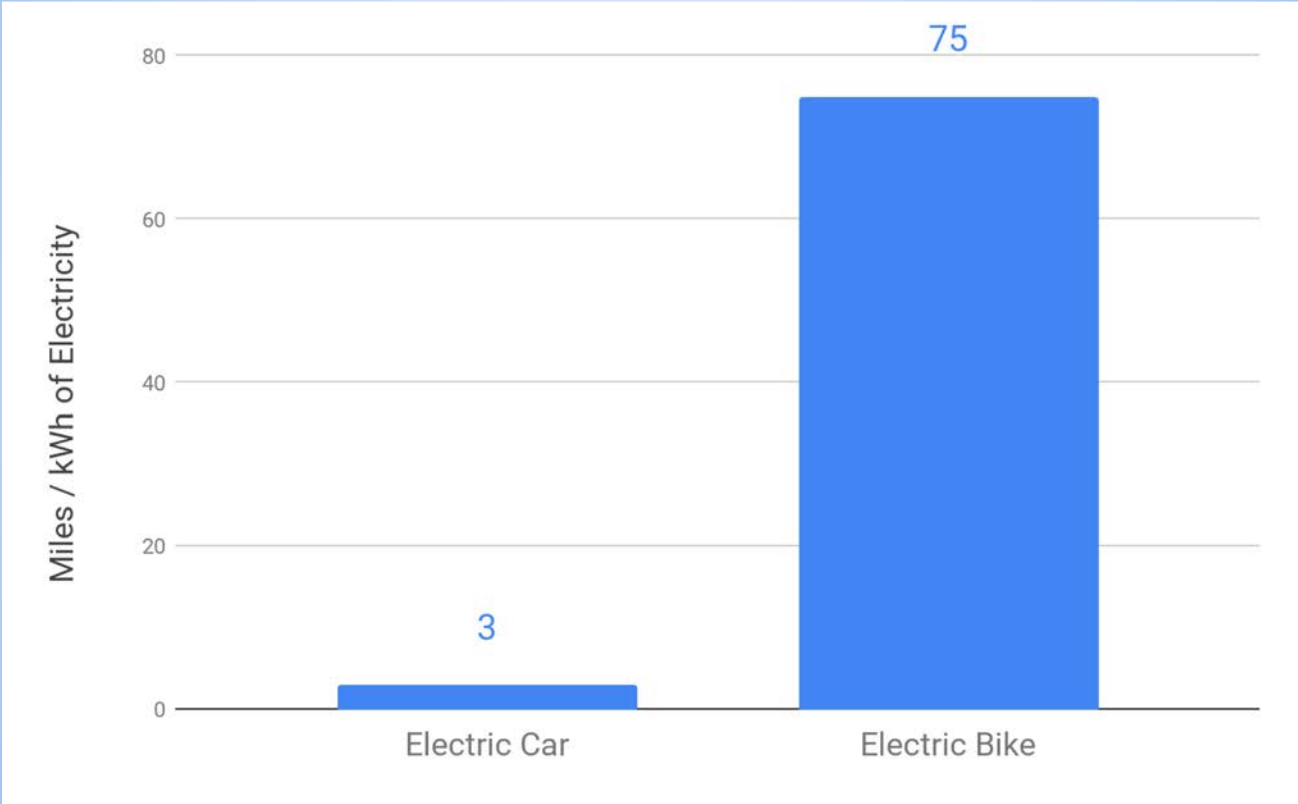
<https://www.ebikes.ca/tools/trip-simulator.html>

Range on One Charge vs. Speed Traveled



About 15 cents
of Electricity
Used

Efficiency of Ebike vs. Electric Car



Data from Prior Graph, 15 mph Ebike Speed

Costs

- Bike Purchase

- \$1,000 - \$10,000 (or \$370 if you have friend in China)
- Mine was \$1,500, no local support
- Sales Growth & Lithium Battery Price Declines → Lower Prices

- Ongoing Costs

- Electricity Cost: 0.3 cent/mile
- Battery Replacement after ~15,000 miles, \$350, 2.3 cents/mile then
- Motor: ?? Lots of Steep Hills are Rough on Hub Drive Motors
- More Parts to Fail !

Ebike Suppliers and Info

- Ebike Suppliers
 - Local Ebike Shop: [Alaska E-Bike](#)
 - Most all Bike Shops have Ebikes
 - Online Suppliers (many more than shown here)
 - [Rad Power Bikes](#): Largest Online US Supplier
 - [Ride1Up](#): My Ebike Supplier
- Electric Bike Information
 - [Electric Bike Review \(EBR\)](#): Tons of Ebike Reviews, Videos & Q&A
 - [Elektrek](#): Ebike Articles & Reviews
 - [Grin Technologies](#): Trip Simulator, Detailed Technical Info & Articles

These Slides available at: bit.ly/ebike-acat

Extras: GoCycle Folding Process

