


# e-Bike Introduction

What can an e-bike do for you?



# Why Choose an e-Bike?

- Fun (grin-inducing boost!) 
- Exercise (more than you'd think!)
- Utility (car-replacement abilities!)
- Green cred (for reals! See [https://www.youtube.com/watch?v=HW5b8\\_KBtT8](https://www.youtube.com/watch?v=HW5b8_KBtT8))

# My First e-Bike



- Grin Technologies ([www.ebikes.ca](http://www.ebikes.ca)) conversion of Giant Anthem (2003 model)
  - Bafang G310 rear hub motor kit
  - 500 Wh battery
  - Throttle
- Personal note: I do not recommend using a full-suspension bike as a conversion unless it is relatively recent, as old shocks may use discontinued parts



# My Family's e-Bike



- Bosch mid-drive
  - Performance Line, 65 Nm torque
  - 400 Wh battery
  - Pedal assist only (no throttle)
- Mid-tail cargo/commuter bike
  - 24" wheels
  - Front and rear racks
- 3 passengers plus rider in theory
  - 2 kids on back (with attachments)
  - 1 kid on Mac Ride (<https://mac-ride.com/>)
- 130 lb rear rack weight limit, 45 lb front rack

# Legal Limitations

- Ontario
  - 500-Watt motor power (note: this does NOT affect battery capacity, which is in Watt-hours)
  - 32 km/h top speed for assistance (you can pedal faster or go faster on descents)
- USA
  - Different e-bike classes (Class 3 allows assist up to 45 km/h, yikes!)

# Types of e-Bike

- Hybrid
- Commuter/City
- Cruiser
- Moped/café racer
- Fat tire
- Folding (may or may not have fat tires)
- E-MTB
- Touring/gravel
- Cargo (short, mid, long-tail)
- Bakfiets (literally “box bike” in Dutch, ultimate cargo and kid carrier)

# Types of e-Bike

- Hybrid, commuter, cruiser



# Types of e-Bike

- Moped/café racer, fat tire, folding, folding fat tire



\*I don't like that the saddle can't be adjusted on this type, but to each their own!

# Types of e-Bike

- Cargo and bakfiets (box-bike)



\*The ultimate cargo/kid hauler!

# Types of e-Bike

- E-MTB, touring, gravel



\*This doesn't even look like it has a motor or battery, but it does!

# Charging Your e-Bike

- Easy peasy! Plug into a typical 120V outlet, wait 3-5 hours
  - almost all bikes will come with appropriate charger, the exception is e-bike conversions which may require a separate charger purchase (ask vendor!)
- May want to look for UL certification for additional peace of mind (UL certification is becoming more common)
  - UL 2271 battery certification
  - UL 2849 full e-bike certification
- **NEVER** charge a battery below 0°C!!! Let it warm up first if riding in the cold

# Technical Note 1: Mid- vs Hub-drive



- Mid-Drive: motor is mounted at bottom bracket (between your feet)
  - Advantages: better weight distribution, usually torque sensor used for better pedal assist feel
  - Disadvantages: may be more expensive, uses bike drivetrain (additional wear), does not pair well with throttle (if that's something you want)

# Technical Note 1: Mid- vs Hub-drive

- Hub-drive: motor is mounted in middle of wheel (usually but not always the rear)
  - Advantages: can be retrofit easily, does not use bike drivetrain (less wear), can use throttle, may be cheaper than mid-drive
  - Disadvantages: poorer weight distribution (important for mountain bike or performance cycling)



# Technical Note 2: Pedal Assist

- Pedal assist can be controlled using different types of sensors, generally either cadence sensors or torque sensors
  - Cadence sensor: cheap, jerkier start
  - Torque sensor: expensive, more natural
- Tip: Test ride if you can (not generally possible for mail-order brands like RAD power bikes, etc., but some may have options, also check with friends 😊)

# Technical Note 2(b): Throttle

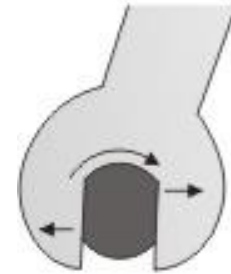
- Throttle generally can be used on retrofit e-bikes and may be available (sometimes as an option) on new e-bikes
  - On my retrofit e-bike, I generally just “pin it” most of the time and pedal along as much (or as little) as I want
- Throttle + pedal-assist can be confusing, may not be recommended, use with caution

# Technical Note 3: Battery Range

- How much battery do you need?
  - Batteries are rated in Watt-hours (Wh) of Energy
    - most vary between 400 and 700 Wh
    - some larger or dual-battery options are available for long distance or all-day cargo use (or you can carry a spare battery to swap in as needed)
  - Range WILL VARY depending on many factors (terrain, wind, road surface, elevation change, pedal input, assist level, etc.)
    - You will almost never achieve “rated max range” unless you are specifically attempting to do so (riding only in ECO mode, for example)
  - Range Simulators:
    - Simple: <https://www.bosch-ebike.com/en/service/range-assistant/>
    - Advanced: [https://ebikes.ca/tools/simulator.html?store=canadian&from\\_store=international](https://ebikes.ca/tools/simulator.html?store=canadian&from_store=international)

# Technical Note 4: To Build or Buy?

- e-Bike kits are available online
- Retrofitting requires decent technical skills, but it's not rocket science 😊
- This is a way to customize your ride, and can be rewarding to do, but is not for everyone
- Bike frame must have suitable dropouts (vertical orientation may be preferred) and a "torque arm" may be necessary in some cases
- See <https://ebikes.ca/> for more info on conversions (Grin Technologies in Vancouver, BC)



Vertical dropout example with keyed axle



Grin Tech torque arm

# Conclusions and Recommendations

- Explore offerings to determine what might work for you (e-bike type, battery size/range, options)
- Go for a test ride if you can!
- Build your own if you're feeling brave!
- Have fun 😊!!!

# Additional Resources (not an endorsement!!!)

- <https://ebikes.ca/> (Grin Technologies, retrofit ebike kits)
- Scooteretti (Ottawa, downtown, Bosch-equipped mid-drive e-bikes only)
- Teslica (Ottawa, Britannia, hub-drive, fat options)
- RAD Power Bikes (mail order)
- iGO Bikes (Montreal-based, mail order)
- Your Local Bike Shop (LBS) may have some!