Comparison of Regenerative Braking Technologies for Heavy Vehicles
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Project Overview
Problem:
- Urban freight delivery by truck is growing
- Current methods are inefficient with regards to the energy expended per tonne of material moved
- Using longer vehicles with steerable trailer axles can reduce energy consumption by up to 25%
- Using regenerative braking can reduce energy consumption by a further 30%

Goals:
- Develop an ultra low-energy urban freight delivery vehicle
- Prove the viability of constructing a trailer with steered axles and regenerative braking

Step One: Choice of Technology
- Compare the different technologies

Step Two: Choice of Hardware
- There are three possible ways to implement this using available technologies:
  1) Variable displacement pump/motor.
  2) Fixed-displacement pump/motor controlled via pulse-width modulation.
  3) Multiple displacement pump/motor, with two or three different displacement settings.
- Each of these was simulated, and the results look promising for each technology.
- The choice of which technology depends on geometric constraints.

Conclusions
- Hydraulic technology is 20% lighter and 55% smaller than competing technologies
- Three different hardware strategies are available, each with different advantages
- Future Plan: Design and build a regenerative axle for the CVDC trailer