

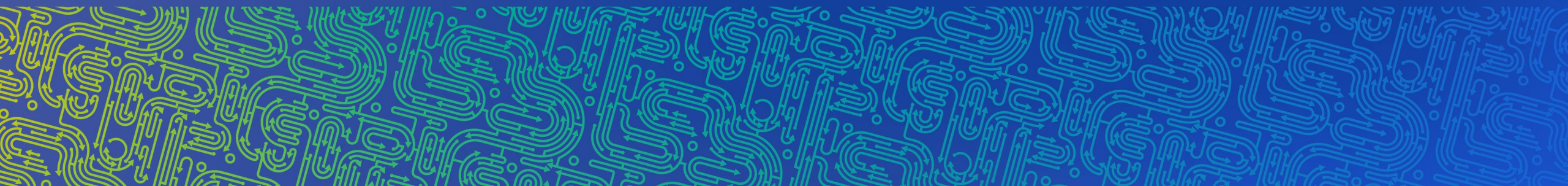
U.S. DEPARTMENT OF
ENERGY

OFFICE OF
Technology Transitions



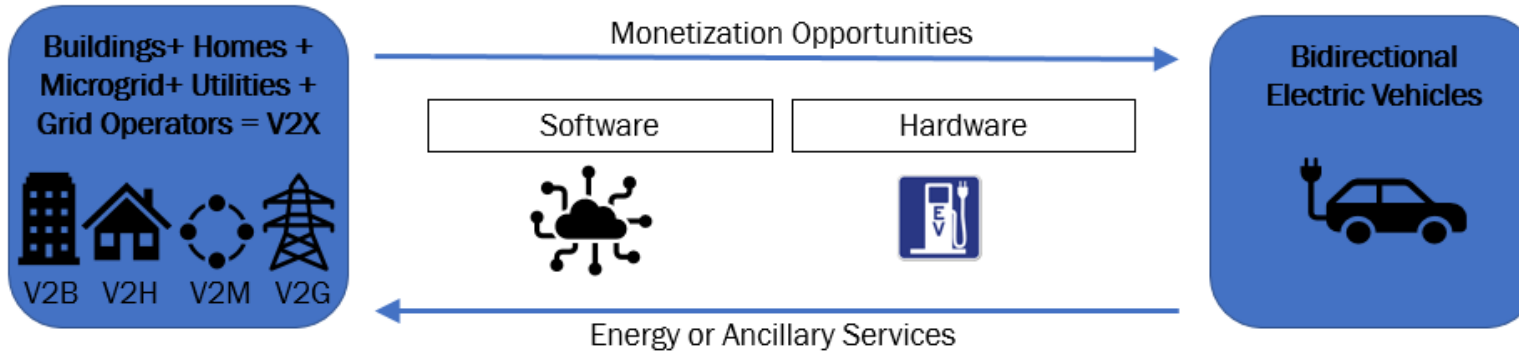
V2X Applications

Rima Oueid, Senior Commercialization Executive



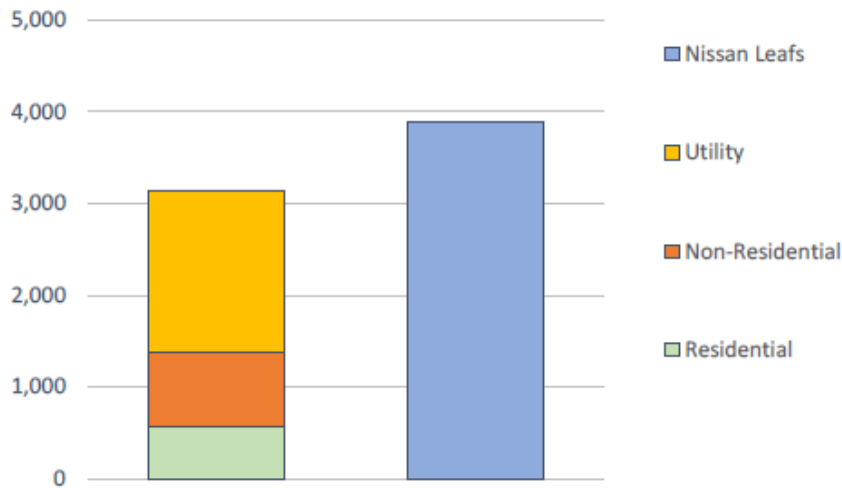
Bidirectional Electric Vehicles = V2B+V2H+V2M+V2G = V2X

Electric Vehicles can be both a mobility asset and an energy asset

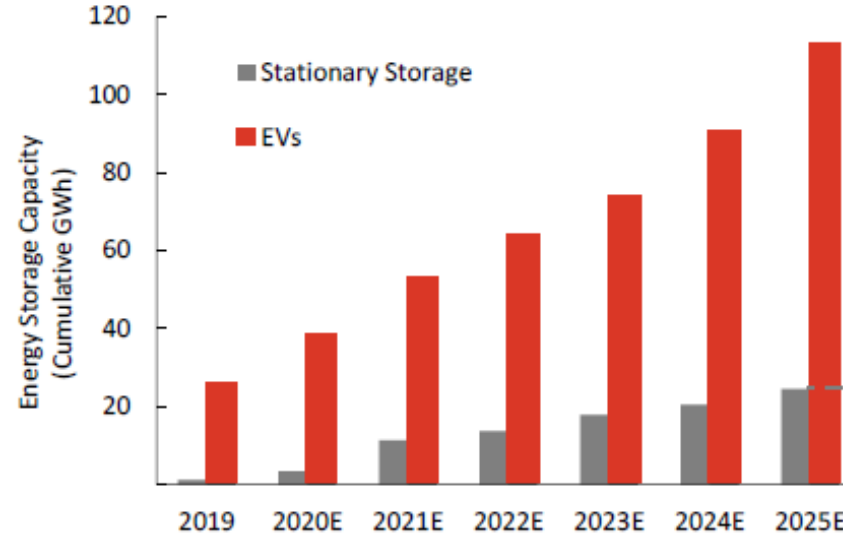


- International Energy Agency estimates 130 million electric vehicles globally by 2030
- These EVs could contain 10 times the amount of energy storage needed by the grid

Cumulative MWh U.S. Deployments (2012-2019)



Source: Wood Mackenzie Energy Transitions Practice, Inside EVs

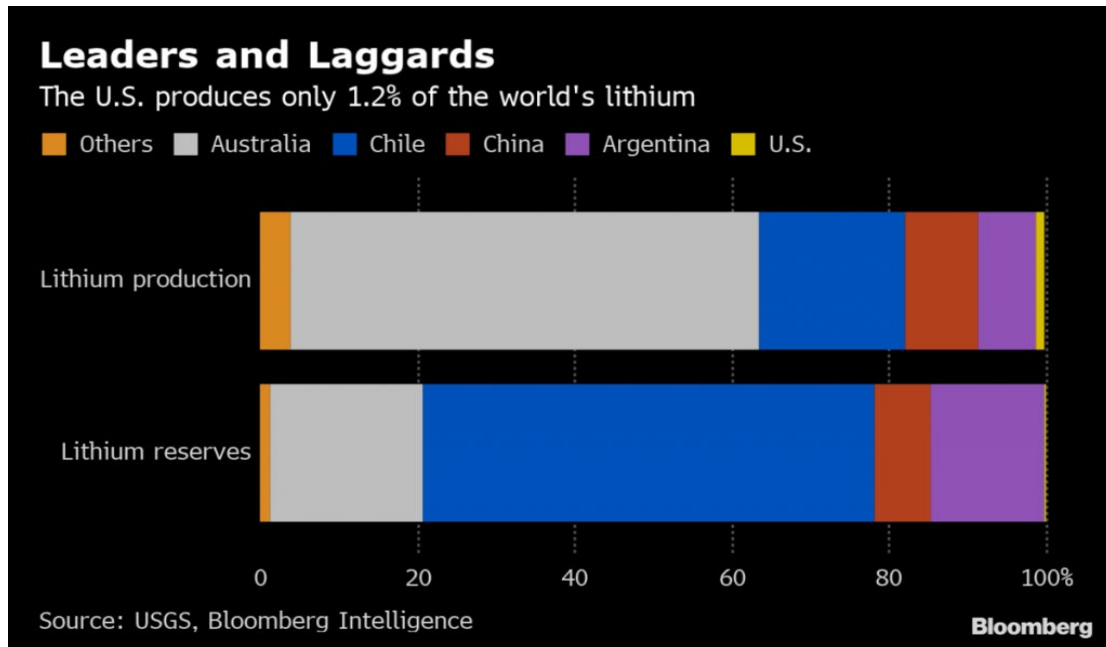


\$28B cumulative spending on energy storage forecasted 2019-2025E

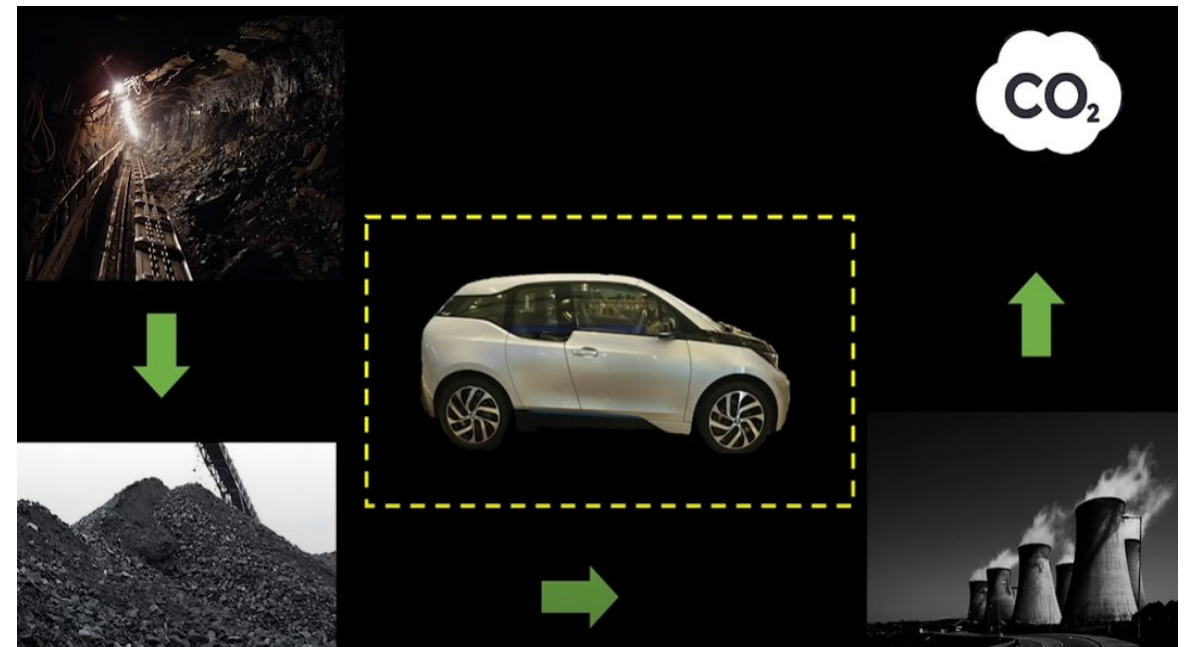
Source: Wood Mackenzie Energy Transitions Practice, Inside EVs

V2X & Sustainability Goals

V2X May Reduce Demand for Rare Earth Elements



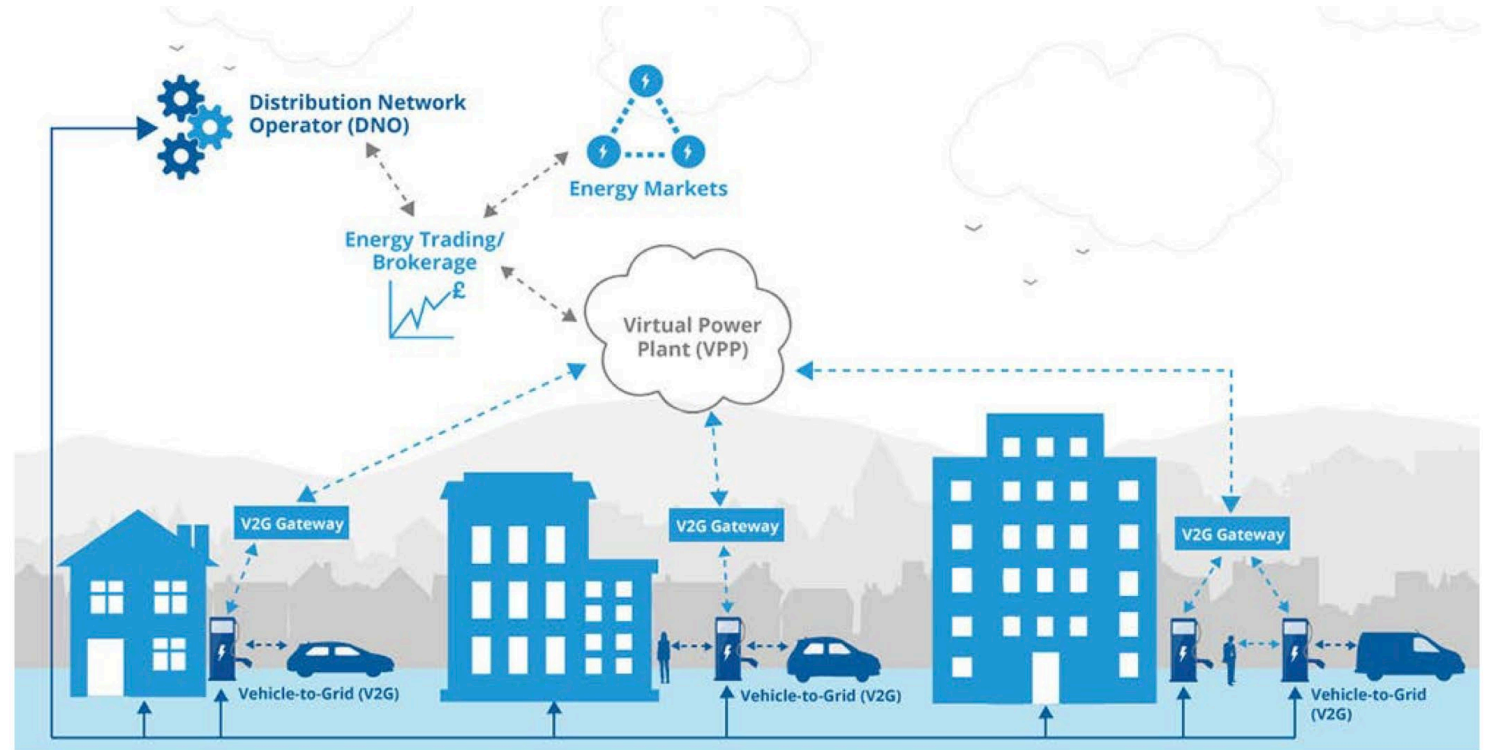
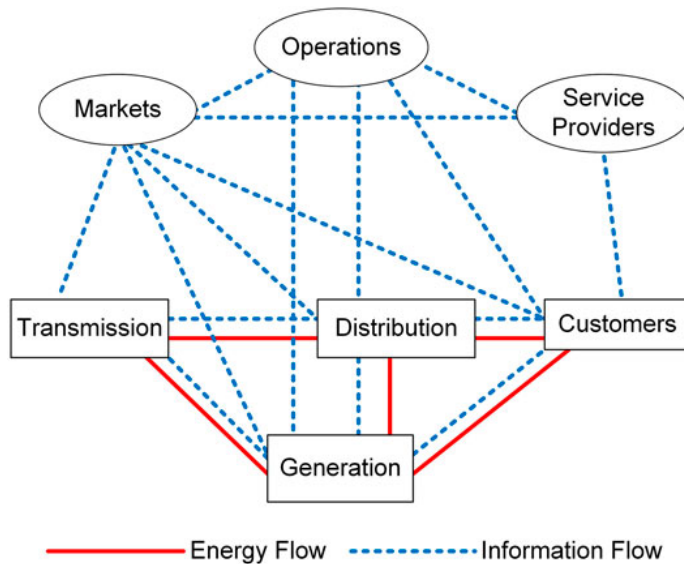
The EV Carbon Story is Incomplete



Source: Graham Conway, Principal Engineer, Southwest Research Institute

The Vision for V2X & VPPs

Enable **transportation and energy networks** to work together as a single **sybiotic system** capable of delivering transport and energy storage services to the grid (e.g **Virtual Power Plants**) and serve as a **catalyst to help modernize the grid and evolve to a Smart Grid**



Schematic Representation of V2G Operations

Source: National Renewable Energy Laboratory