



# Electric Cars: 1900–Today

## Evolution and Outlook

A century-long journey from early urban electrics to today's EV revolution



# Why Electric Cars Matter



## Climate & Air Quality

Zero tailpipe emissions, lower lifecycle CO2 with clean grids



## Energy Security

Reduce oil dependence, lower fuel and maintenance costs



## Urban Health

Cleaner, quieter streets improve livability and public health

# Early 1900s: The First Electric Era

## Market Dominance

Around 1/3 of US cars were electric circa 1900

## Technology

- Lead-acid batteries
- Simple direct-drive motors
- No hand-crank needed

## Appeal

Quiet, easy to drive, favored by urban affluent buyers







# The Decline: ICE Takes Over

## 1910s: Mass Production

Ford Model T and assembly lines slashed ICE prices

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## 1912: Electric Starter

Removed hand-crank disadvantage of gasoline engines

## 1920s-30s: Infrastructure

Cheap oil and widespread gas stations favored long-range ICE

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# Mid-Century: The Quiet Years

## 1930s–1970s

EV tech stagnated while ICE improved dramatically

## Niche Applications

Milk floats, industrial trucks, limited conversions

## Postwar Era

Fuel patterns and infrastructure reinforced ICE dominance



# Oil Shocks Spark Revival



## 1973 & 1979 Crises

Oil shocks triggered alternative-energy research

## Government Response

R&D programs funded EV prototypes and battery development

## Early Learning

Prototypes showed potential but battery limits remained



# 1990s Renaissance: Policy Drives Innovation



## California ZEV Mandate

Forced automakers to produce zero-emission vehicles



## GM EV1 Launch

First modern OEM BEV program, leased late 1990s



## Lasting Legacy

Strong public interest, lessons for future policy and tech



# 2000s: Hybrids Pave the Way

## **Hybrids Go Mainstream**

Toyota Prius normalized electrified drivetrains for millions

## **Technology Spillover**

Hybrid success accelerated battery and power-electronics advances

## **First Mass BEVs**

Nissan Leaf (2010) proved everyday BEV practicality



# The Tesla Effect: Battery Revolution

**80-90%**

## **Cost Reduction**

Lithium-ion battery pack costs plunged since 2010

**300+**

## **Range Miles**

Competitive ranges enabled by energy density improvements

Tesla commercialization and gigafactories created economies of scale, driving consumer demand and performance expectations



# 2020s: Scaling Up Rapidly

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## Rapid Adoption

EV sales and fleet shares surged globally

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## Infrastructure Expansion

Charging networks (Level 2 & DC fast) deployed substantially

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## Policy & Incentives

Subsidies, CO2 standards, ZEV targets steer markets

04

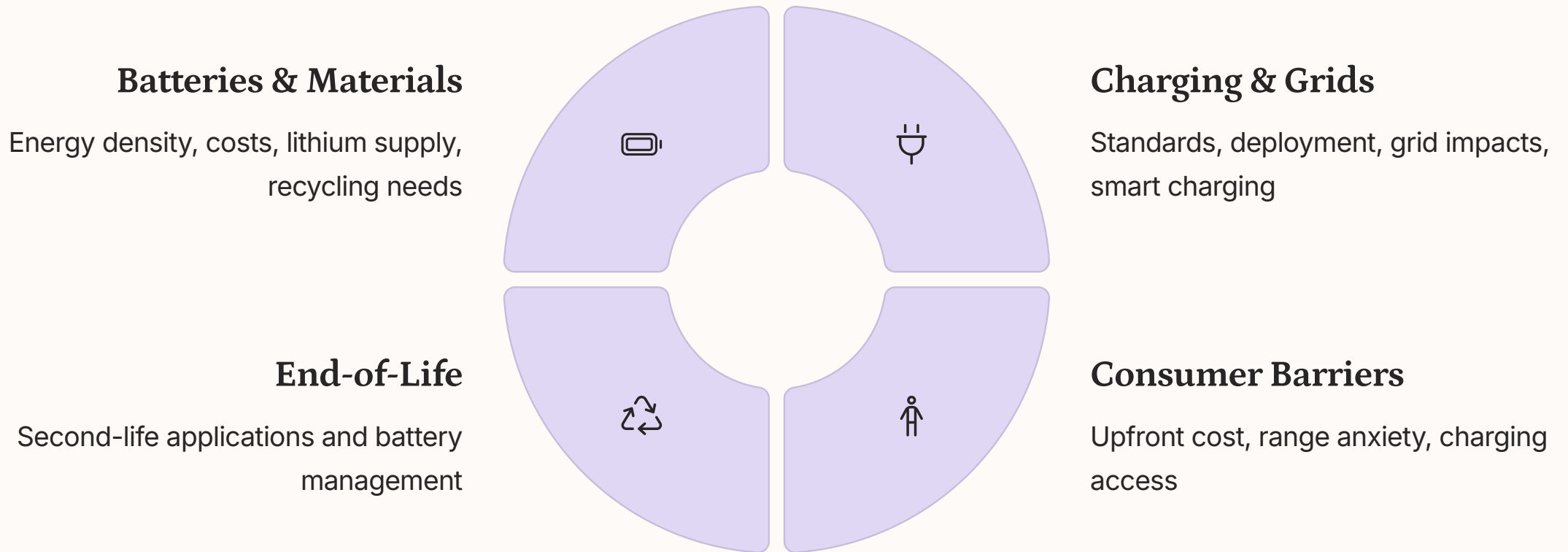
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## Industrial Transformation

OEM electrification commitments reshape supply chains



# Key Technologies & Challenges



# Future Outlook

## Trajectory

Majority EV new-car shares projected by 2035–2040

## Key Priorities

- Expand charging infrastructure
- Secure sustainable material supply
- Develop recycling systems
- Align policy for equitable rollout







## Key Takeaways

### **Technology + Policy**

Combined forces determine adoption speed and scale

### **Battery Costs Decisive**

Continued cost declines unlock mass-market potential

### **Infrastructure Critical**

Charging networks and grid readiness enable growth

From 1900s urban electrics to today's revolution: a century of innovation driven by technology, policy, and infrastructure working together