Electric Vehicle Readiness

City of Tucson Code Amendments for EV Charging requirements in new residential and commercial development
City of Tucson
Electric Vehicle Readiness Roadmap
Promote clean air
Clean air that protects public health, our natural environment and sustainable economic growth.

Accelerate clean energy
Energy that is affordable, reliable and carbon neutral.

Prove effective
Solutions that are integrated, durable, credible, and actionable.

Ensure a healthier future
A process that values equity, access, and healthier communities and environment.

Benefit economy wide
Innovation in how we move, where we live and work, and how we power our economy while limiting adverse impacts in our communities.

Arizona Thrives Alliance
City of Tucson Electric Vehicle Readiness

Strategies

Immediate (Within 6 months)
- Charging demand analysis
- EV website
- Benchmark City's EV needs & opportunities
- Pursue electrification of City's light-duty fleet
- Amend & clarify City policies for greater EV charging
- Adopt EV readiness ordinances for all new development
- Establish, expand and enforce EV parking rules

Short-term (Within 1-2 years)
- Pursue electrification of City's transit
- Install EV charging stations for City fleet
- Encourage EV adoption by City employees
- Allow right-of-way locations for EV charging installations
- Provide incentives and then mandates for charging infrastructure in new developments
- Support public charging station installation
- Recognize local businesses with workplace charging

Long-term (Within 10 years)
- Encourage EV adoption in car sharing/ride-hailing and delivery companies
- Pursue living laboratory projects

Medium-term (Within 3-5 years)
- Incentivize community members to purchase EVs
- Support smart grid operations for EV
- Increase renewable electricity for EV charging
- Assess and adjust utility rate structures for EV riders

Outreach & Education
Leading by Example
Policies
Incentives
Utilities
City Planning & Regional Coordination
Emerging Technologies

(Within 6 months)
(Within 1-2 years)
(Within 3-5 years)
Ongoing
Actions within 6 months

- Charging demand analysis
- EV website

- Benchmark City's EV needs & opportunities
- Pursue electrification of City's light-duty fleet

- Amend & clarify City policies for greater EV charging
- Adopt EV readiness ordinances for all new residential, multi-family and commercial developments
- Establish, expand and enforce EV parking rules
Electric Vehicle Readiness

City of Tucson Code Amendments
for EV Charging requirements in new residential and commercial development
Proposed Text Amendment

1. Require EV Readiness in new multifamily and commercial development and provide incentives for additional infrastructure beyond minimum standards.

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<th>Proposed</th>
<th>MULTIFAMILY ...... 25%</th>
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Requirements are for new construction or existing expansion thresholds in the UDC.

2. Expand the use of the Individual Parking Plan (IPP) application by including affordable housing as a permitted type of development and removing the restaurant and bar exception.

   All existing IPP application requirements, protections, and approval procedures would remain and apply to these uses.

Planning Commission voted 8 – 0 in support

   with additional recommendations to the Mayor and Council
   • review the amendment in 1-2 years, and
   • consider reducing the minimum parking requirement for affordable housing
EV Roadmap

Adopted April 2021

Item for immediate action:
**Adopt EV readiness ordinances for all new development**

**Immediate** (Within 6 months):
- Charging demand analysis
  - EV website
- Benchmark City’s EV needs & opportunities
- Pursue electrification of City’s light-duty fleet
- Amend & clarify City policies for greater EV charging
- Adopt EV readiness ordinances for all new development
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- Incentivize community members to purchase EVs
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- Assess and adjust utility rate structures for EV riders
On June 22, 2021, The City of Tucson M&C adopted an amendment to the building code requiring EV Readiness in new single family residential. This amendment:

- Outreach conducted over a two-year period – recommended by code and climate committees
- Applied to one- and two-family dwellings
- Was based on code development by the International Code Council to align with future code amendments to other jurisdictions nationally
- Specified a 40 amp outlet to be universal to the majority of electric vehicles currently on the market
- When adopted, M&C directed staff to address multi-family and commercial
Stakeholder Engagement

2021

- Spring
  - Mayor & Council Direction
    - 6/22/2021
    - 9/28/2021

2022

- Summer
  - Research

- Fall
  - Draft Proposals

- Winter
  - Stakeholder Meetings
  - Public Meetings

- Spring
  - Present Proposal to:
    - Planning Commission
      - 2/2/2022
      - 3/2/2022
    - Mayor & Council
      - 4/19/2022

https://www.tucsonaz.gov/pdsd/commercial-parking-amendments

*Adoption of EV Ready requirement for 1 and 2 family residential
National Trends

Market Availability

50 EV models available today
130 EV models expected by 2023

According to one study, EVs should be cheaper to buy on average than combustion vehicles in about 5 years, without subsidies

6 Major automakers (Ford, GM, Volvo) pledged to phase out new gas and diesel vehicles by 2035-2040

New building lifespan average starts at 30 years

Federal Priority

- 50% EV share by 2030
- Acceleration and deployment of EV tech, charging infrastructure, alternative fuel corridors, EV jobs prioritized in Electric Vehicle Charging Action Plan
EV Ownership

National EV Share
2%
2018 – 2020

Newer models outnumber older ones, suggesting stronger EV sales in recent years.

More affordable models of EVs make up the majority, like the Model 3 Tesla and the Nissan Leaf.

About one in 300 vehicles in the Tucson Metro Area is an EV

Around 1,000 EVs are registered within the City of Tucson itself.

Total Electric Vehicles by Model Year
Registered in Zip Codes within a 1-hour drive of Tucson

Zip codes within 1-hr drive of Tucson
Total population: 1.2M
Total vehicles: 800k
Total EVs: 2,000 (~1 in 300)

Tucson zip codes
Total population: 570k
Total vehicles: 350k
Total EVs: 1,000 (~1 in 60)
Peer City Research

**National**
- 2018 – 2020 EV Share: 2%

**Arizona**

**Tucson**
- 2021
- EV Ownership: 2%
- All New Development 200+ spaces: 2%
- Multi-family 9+ spaces: 20%
- Non-residential: 50%
- Multi-family & Hotel: 100%

**Phoenix**
- 2019 – 2020
- EV Roadmap in development
- EV Ownership: 3% - 4%
- All ADA Spaces: 20%
- Non-residential: 10%
- Multi-family & Hotel: 10%

**Salt Lake City**
- 2018
- Multi-family: -25%
- Conduit: 0% - 1%

**Miami Dade**
- 2019
- Multi-family 9+ spaces: 20%
- Conduit: 3% - 4%

**San Jose**
- 2020
- Non-residential: 50%
- Conduit: 10%

**Albuquerque**
- New Mexico 2021
- EV Ownership: 2%
- All EV Station = - 2 Spaces

**Mesa**
- Likely similar to Phoenix
- EV Roadmap in development
- Compact parking spaces + 1% for every 2 EV stations, up to 25%

**Incentives**
- Incentive only: Total parking spaces - 1 for every 1 EV station, up to 25%
- Incentive only: Compact parking spaces + 1% for every 2 EV stations, up to 25%
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**Incentives**
- 1 EV Station = - 2 Spaces

**Note:**
- Likely similar to Phoenix
- All ADA Spaces EV Capable

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- All New Development 200+ spaces: 2%
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**Notes:**
- Tucson: 0% - >1%
- Phoenix: 3% - 4%
- Salt Lake City: 2.5%
- Miami Dade: 2%
- San Jose: >20%

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Charging Habits & Patterns

Expanding the infrastructure network will help make EVs a viable option for all drivers, even those without garages

**Charging at home**
- More than 80% of EV drivers charge their cars at home
- It requires no (waking) time, no detours, and is gentler on the battery than high speed charging

**Charging at multifamily buildings**
- About half of Americans do not have access to a dedicated off-street parking space for overnight or low cost EV charging

**Charging at workplaces**
- Employers can help increase the convenience and affordability of driving electric for their employees

**Public charging**
- Public charging stations can increase the daily useful range of EVs
- Public charging stations should typically be located where vehicle owners are highly concentrated and parked for long periods of time, such as shopping centers, airports, hotels, government offices, and other businesses
### EV Readiness

**Future**

**EV Capable Conduit**

- electric capacity
- "pre-wired"
- future EV parking space

- Includes hard to retrofit elements during new construction
- Minimizes upfront costs

**Current**

**EVSE Ready Outlet**

- electric capacity
- wiring
- outlet
- ready to charge EV parking space

- Ready to “plug in”
- Infrastructure can still be upgraded

**EVSE Installed Station**

- electric capacity
- wiring
- charging station
- ready to charge with controlled access EV parking space

- Most visible commitment to EV charging

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**Electric Upgrades**

- Trenching / conduit . . . . . . . $20 – $41 per linear ft
- Electric upgrades . . . . . . . . $0 – $27,500 per lot

**Retrofits**

- 300% more on average

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**Charging Station**

- $500 – $4,100 per space

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**Existing requirement for new 1 & 2 family residential in Tucson**

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**swenergy.org**

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**bea.gov/ energysolutions.com**
Proposal Goals

In addition to furthering the goals outlined in the EV Roadmap

Ensure equitable access to the benefits of advancing technology, cost savings, and environmental benefits of EV adoption

Provide significant cost savings by avoiding extensive future retrofits to add EV charging infrastructure in the future

Implement baseline requirements at various commercial locations, based on visitation frequency, parking time, and diverse users

Require the most usable readiness for the least cost in building lifetimes to span the next 30 years and beyond
## Proposal

<table>
<thead>
<tr>
<th>Total EV Requirement</th>
<th>Stations</th>
<th>Outlets</th>
<th>Conduit</th>
<th>Incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multifamily 25%</td>
<td></td>
<td>10%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Commercial 20%</td>
<td></td>
<td>5%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Retail 10%</td>
<td></td>
<td>5%</td>
<td>5%</td>
<td></td>
</tr>
</tbody>
</table>

**Summary**

- **outlets & conduit required**
  - EV drivers most likely to charge at home.
  - Residents’ regular use possible to manage without stations
  - The regularity and duration of a work shift is next preferred for charging.
  - Employees’ regular use possible to manage without stations

- **stations & outlets required**
  - Shorter dwell times than home or workplace
  - Public charging stations can increase the daily useful range of EVs
  - Stations are appropriate interface for varied EV drivers/visits

**Level of EV Readiness**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Multifamily</th>
<th>Commercial</th>
<th>Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>25%</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Exception:** Retail uses with less than 100 motor vehicle parking spaces are exempt from required EVSE.

Reductions possible up to 30% reduction of required lot size
# Cost Estimates

Requirements are for new construction or existing expansion thresholds in the UDC

<table>
<thead>
<tr>
<th>EV Readiness Level</th>
<th>New Construction</th>
<th>Retrofit</th>
<th>Unit</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trenching</td>
<td>$11 - $19</td>
<td>$100 - $150</td>
<td>$ / linear ft</td>
<td>afdc.energy.gov, wisercosts.com</td>
</tr>
<tr>
<td>Conduit</td>
<td>$11 - $23</td>
<td></td>
<td>$ / linear ft</td>
<td></td>
</tr>
<tr>
<td>NEMA 14-50 Outlet</td>
<td>$15 - $50</td>
<td></td>
<td>$ / outlet</td>
<td></td>
</tr>
<tr>
<td>Station</td>
<td>$500 - $4,100</td>
<td></td>
<td>$ / station</td>
<td>afdc.energy.gov, online.ogs.ny.gov</td>
</tr>
<tr>
<td>Custom Signage and Striping</td>
<td>$500 - $1,500</td>
<td></td>
<td>$ / project</td>
<td>futureenergy.com</td>
</tr>
</tbody>
</table>

### Possible Electrical Upgrades

<table>
<thead>
<tr>
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<th>New Construction</th>
<th>Retrofit</th>
<th>Unit</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Panel Upgrade</td>
<td>$1,800 - $2,500</td>
<td></td>
<td>$ / project</td>
<td>afdc.energy.gov</td>
</tr>
<tr>
<td>Transformer Upgrade</td>
<td>$10,000 - $25,000</td>
<td></td>
<td>$ / project</td>
<td></td>
</tr>
</tbody>
</table>

### Current Incentives (Rebates)

<table>
<thead>
<tr>
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<th>Retrofit</th>
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<th>Sources</th>
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<tbody>
<tr>
<td>TEP Workplace</td>
<td>$4,500</td>
<td></td>
<td>$ / station</td>
<td><a href="http://www.tep.com/smart-ev-charging-program">www.tep.com/smart-ev-charging-program</a></td>
</tr>
<tr>
<td>TEP Multifamily and Non-Profit</td>
<td>$6,000</td>
<td></td>
<td>$ / station</td>
<td><a href="http://www.tep.com/smart-ev-charging-program">www.tep.com/smart-ev-charging-program</a></td>
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<tr>
<td>Federal tax credit</td>
<td>$30,000</td>
<td></td>
<td>$ / project</td>
<td>afdc.energy.gov, irs.gov</td>
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## Cost Estimates per space before electrical upgrades or rebates (listed above)

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<tr>
<td>Multifamily</td>
<td>$95 - $960 per space</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>in parking lot sizes from 10 – 100 spaces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project cost</td>
<td>$1,240 - $25,800</td>
<td></td>
<td></td>
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<tr>
<td>Commercial</td>
<td>$85 - $930 per space</td>
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<td>$1,100 - $23,800</td>
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<tr>
<td>Retail</td>
<td>$180 - $610 per space</td>
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<tr>
<td>Project cost</td>
<td>$18,000 - $60,973</td>
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Further Considerations

Accessibility

• Four percent (e.g., 1 in 25 spaces) but no less than one of the EV charging spaces, in any given parking facility, must be accessible compliant.
• These spaces are accessible EV charging spaces, not ADA parking spaces.

Guidelines Recommended

Signage & markings
• Regulations
• Wayfinding
Lot design
• maximum EV visibility
• user ease and safety
• implementation cost savings
## Feedback – EV Readiness

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<th>Issue</th>
<th>Proposal</th>
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<td>• Concern that affordable housing, small businesses will be cost burdened</td>
<td>• Guided by equitable distribution of EV access</td>
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<td>• Opinion that EV charging should be market driven</td>
<td>• Multifamily and commercial use requires lower cost EVSE</td>
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<td></td>
<td>• Exception for retail with less than 100 parking spaces (less than 10,000sqft)</td>
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<tr>
<td>• Interest in increasing requirements in phases</td>
<td>• Guided by aligning Tucson’s EV readiness with new building life cycles and EV trends. Phased requirements could miss that alignment opportunity</td>
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<td>• Concern that average Tucson income levels not comparable to EV adoption &amp; requirements in California cities (50% - 100% San Jose)</td>
<td>• The proposed requirements are most like those in Salt Lake City, UT, which has an estimated 2.5 percent EV adoption rate</td>
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