TEP Electric Vehicle 5-Year Strategic Roadmap

External - AZ TE Plan

Completed Feb. 2020

Tucson Electric Power

Contents

Executive Summary

TEP EV Focus

- In December 2019, TEP, APS, and SRP jointly filed the **Statewide Transportation Electrification Plan for Arizona**.
- This document synthesizes **TEP's Electric Vehicle 5-Year Strategic Roadmap**, including its vision statement and a proposed initiative implementation roadmap for 2020-2025.
- Roadmap development was informed by a **stakeholder interview process** within TEP's EV partner ecosystem that took place in November-December 2019.
- TEP's vision is to **be a leader in Southern Arizona's effort to electrify transportation**, for a cleaner and more sustainable community.
- Its mission will be **guided** by the following **principles**:
  - lead by example,
  - empower customers,
  - balance economic impacts, and
  - support environmental and health benefits.

TEP EV Action

- TEP has identified **challenges to overcome** and developed **mitigation strategies** spanning across the following themes:
  - TEP's internal evolution
  - Stakeholder education and engagement
  - Market and regulatory
- TEP has developed a proposed list of **48 initiatives** that fall under **4 opportunity areas**:
  - Driving Partnerships and Collaboration
  - Driving Supportive Policies and Incentives
  - Driving Consumer Awareness and Education
  - Driving Charging Infrastructure Deployment

TEP EV Roadmap

- Guidehouse subject-matter experts with broad EV experience were leveraged to prioritize initiatives based on expected **stakeholder value** and **executability**.
- **Initiatives already underway** were included in the Roadmap as they represent foundational initiatives.
- For each opportunity area, TEP **prioritized** the proposed initiatives into **3 waves**:
  - Wave 1 starting between 2020 and 2022
  - Wave 2 starting between 2022 and 2024
  - Wave 3 starting after 2024
- Each timeline includes any **dependencies** between initiatives, as well as any **complementary activities** throughout the initiative duration.
- **TEP plans to undertake all 48 initiatives** in the roadmap to support accelerated EV adoption in Southern Arizona

Section 1

TEP EV Focus

TEP's vision is to be a leader in Southern Arizona's effort to electrify transportation, for a cleaner and more sustainable community

Vision

Be a leader in Southern Arizona's effort to electrify transportation, for a cleaner and more sustainable community.

Mission

Accelerate electric vehicle adoption in Southern Arizona through collaboration, promotion and education, guided by the following principles:

- lead by example,
- empower customers,
- balance economic impacts, and
- support environmental and health benefits.

TEP's mission will be guided by the following principles

Lead by Example

- Become EV experts that understand the benefits, availability, cost, technology and planning related to transportation electrification
- Ensure development of internal policies, procedures and programs to support EV adoption
- Advocate for policies that encourage EV adoption
- Proactively collaborate with partners and stakeholders

Balance Economic Impacts

- Ensure prudent investments when enabling transportation electrification
- Make EV charging infrastructure accessible to the local community
- Optimize deployment of grid assets to accommodate EV charging infrastructure
- Promote EV initiatives that seek to balance benefits and costs

Empower Customers

- Provide information, tools, and options for customers
- Enhance customers' understanding of EV benefits
- Address barriers to EV adoption for customers

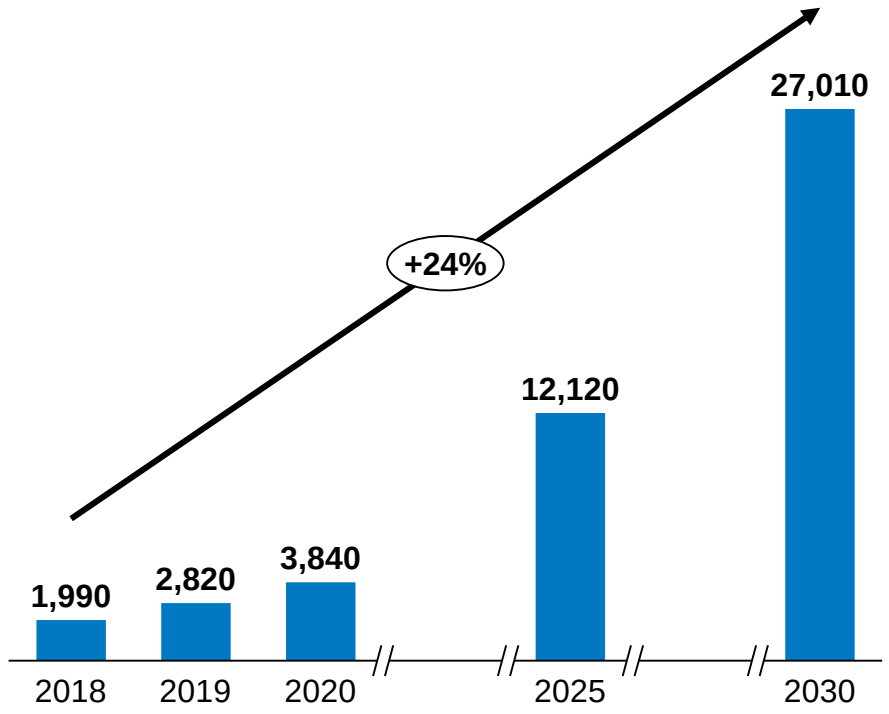
Support Environmental and Health Benefits

- Inform customers on the health and environmental benefits of EVs
- Support local air quality improvement
- Incorporate sustainability practices into EV programs

Assuming no proactive market intervention by TEP or others, the baseline for EV population in Tucson is expected to increase tenfold between 2019 and 2030

EV Population Forecast in TEP's Service Territory

2018-2030, Baseline Scenario



	2018	2019	2020	2025	2030
EV Population As Share of Total Vehicle Population	0.3%	0.4%	0.5%	1.3%	2.5%

Source: Guidehouse analysis, Dec. 2019

Scope

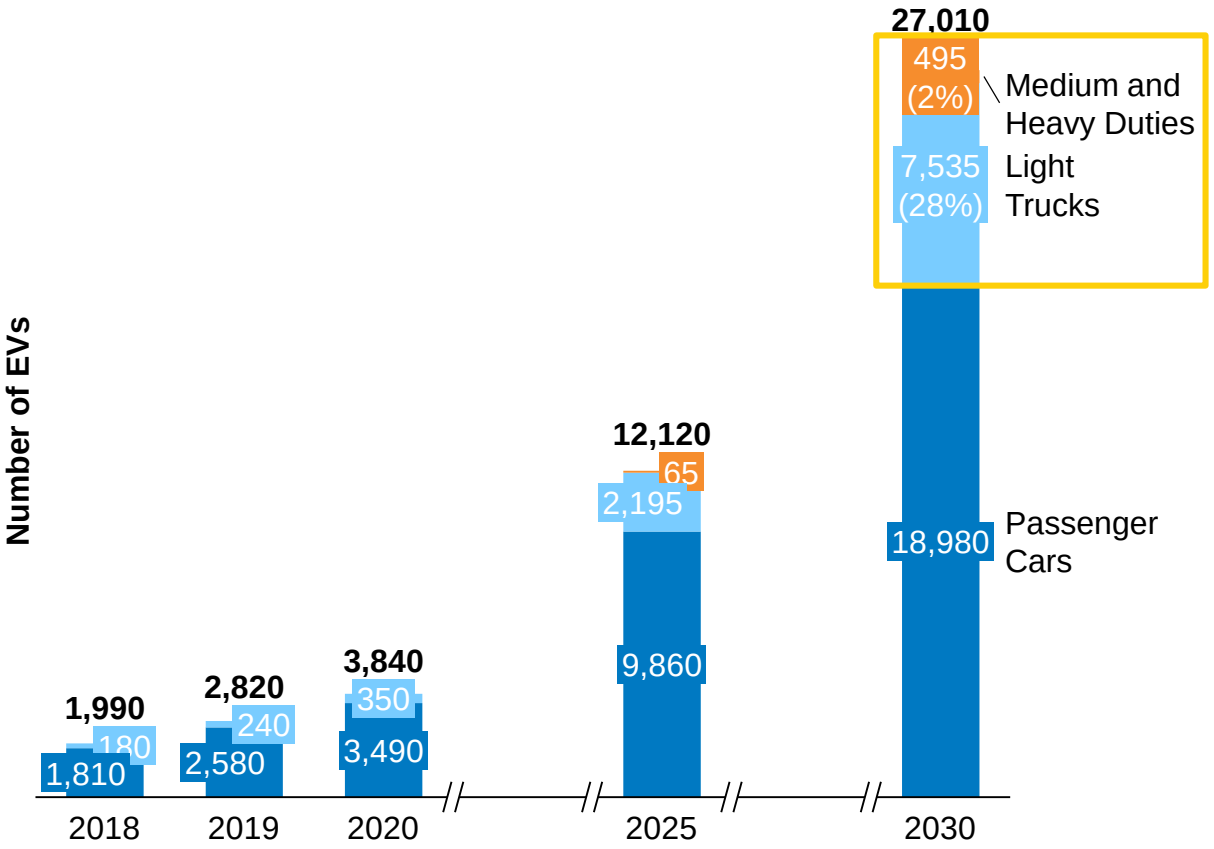
- Within TEP's service territory
- Including battery electric vehicles and plug-in hybrid electric vehicles
- Including light, medium and heavy-duty vehicles
- Including individually and fleet owned vehicles
- Assuming no proactive market intervention

Methodology

- Leveraging VAST™, a proprietary model developed by Guidehouse to forecast geographic penetration and dispersion of electric vehicles
- Taking inputs at the census tract level, including:
  - Vehicle registrations by make and model
  - Expected gasoline and battery prices
  - Vehicle lifetime
  - Incentives
  - Annually collected survey data on vehicle owners
  - Demographic data, e.g., population, income, units in housing structure, vehicle ownership, household counts, educational attainment

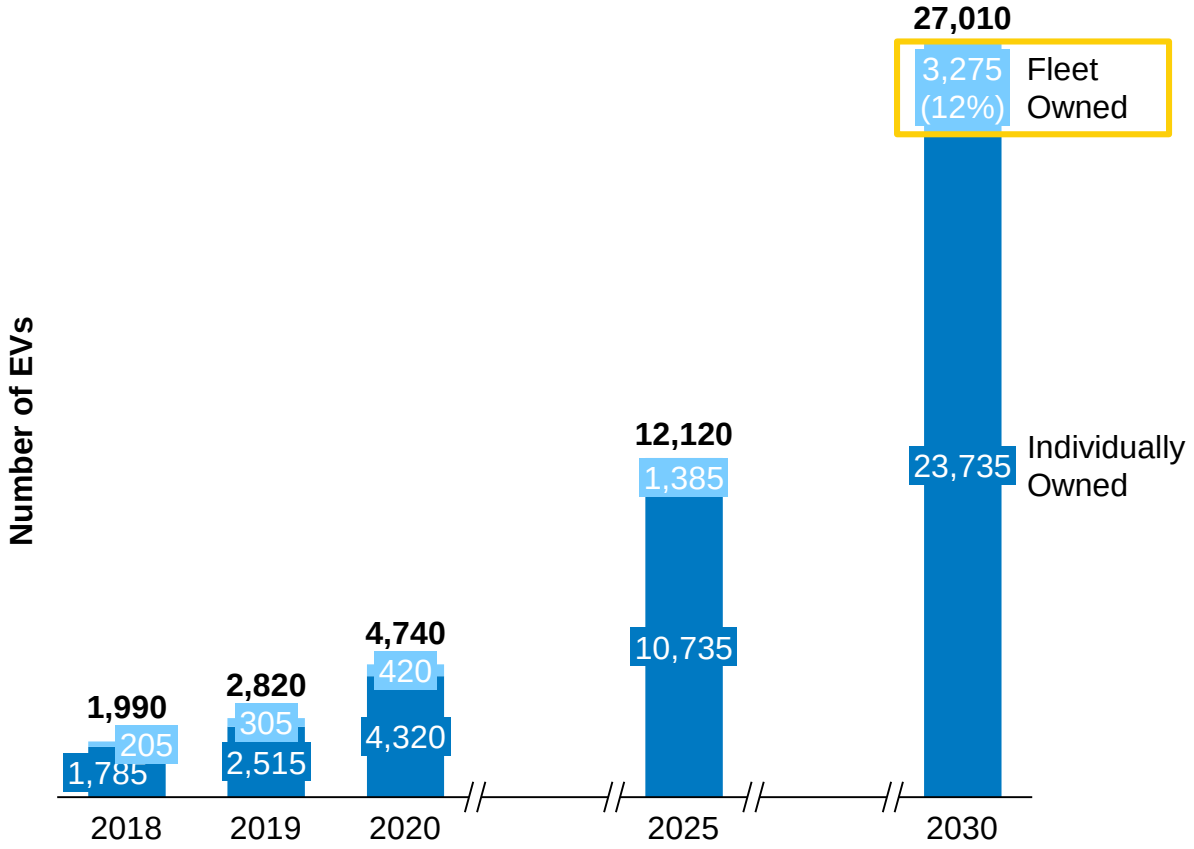
Assuming no market intervention, the baseline for larger, fleet-owned vehicle adoption is expected to accelerate in Tucson toward 2030

Light trucks and medium / heavy duty vehicles will play an increasing role…



Source: Guidehouse analysis Dec. 2019

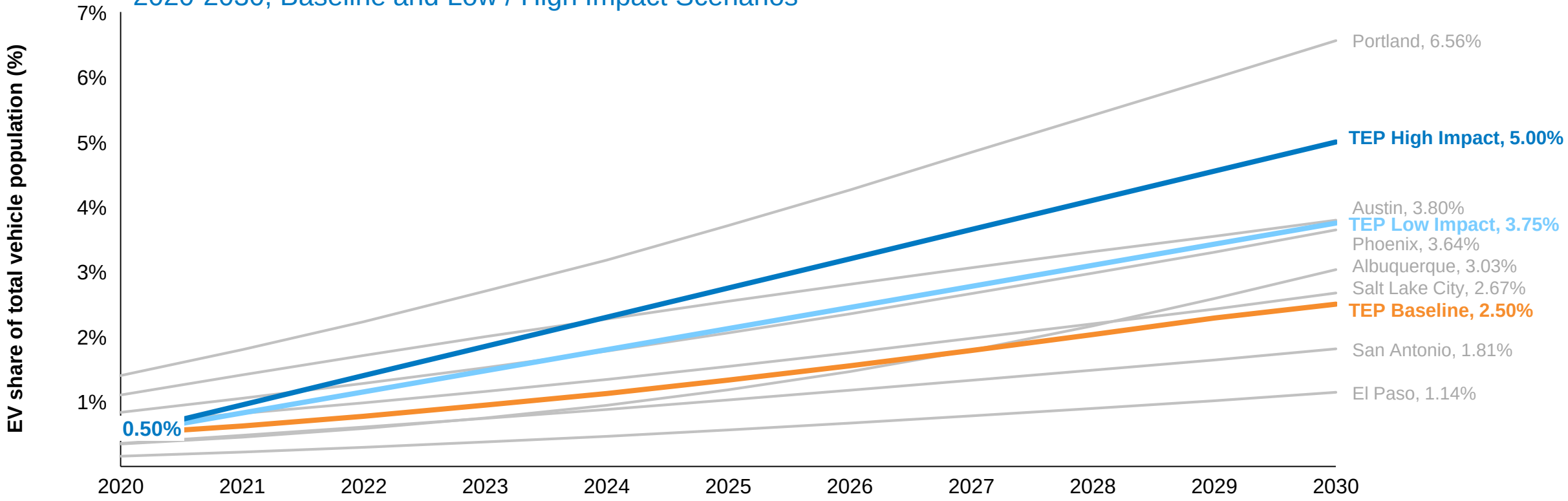
…as public and private organizations electrify their fleet



Based on benchmarking with similarly-sized metropolitan areas in the Southwest, TEP aspires for the EV population in its service territory to reach 3.75% - 5% of vehicles by 2030

EV Population Forecast in TEP's Service Territory and Benchmarked Metro Areas

2020-2030, Baseline and Low / High Impact Scenarios

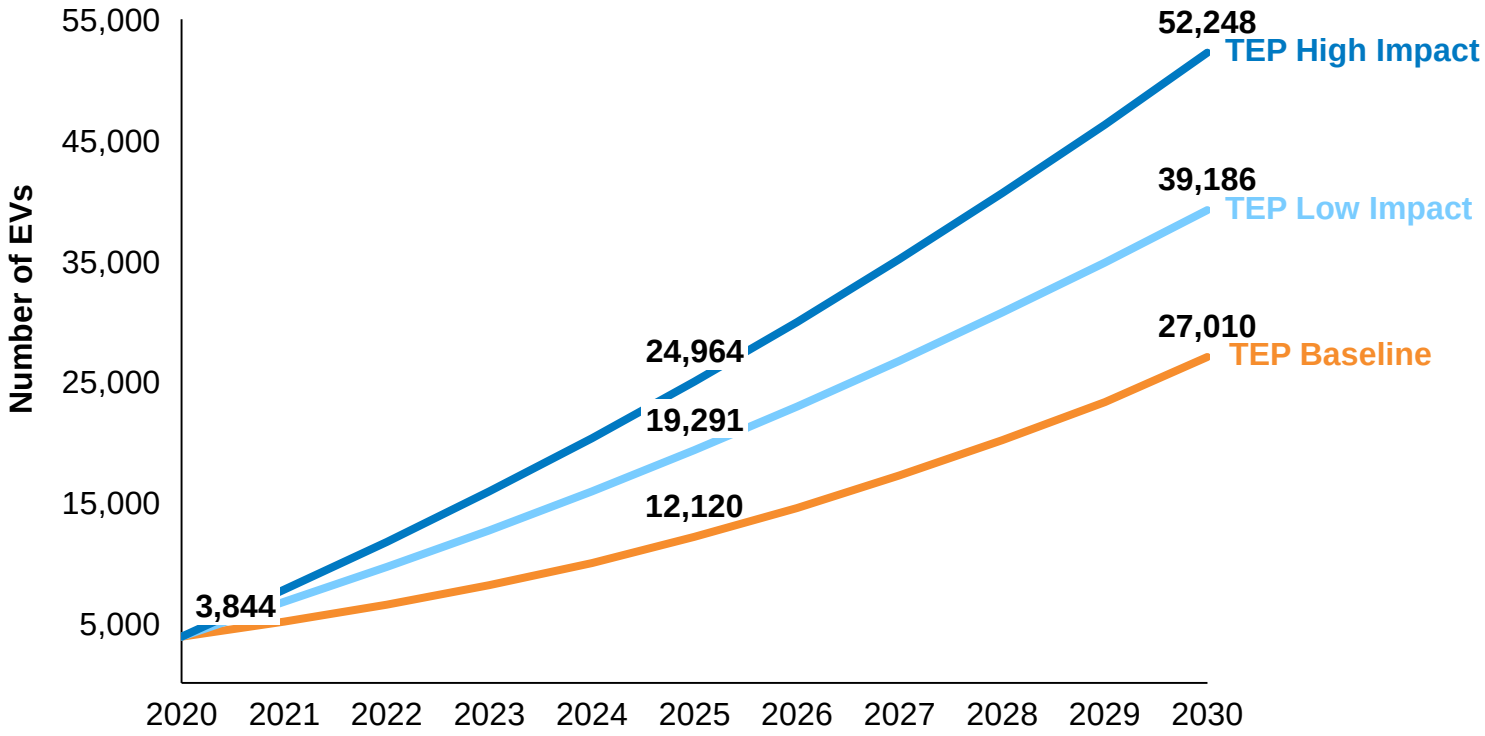


Source: Guidehouse analysis

Based on benchmarking with similarly-sized metropolitan areas in the Southwest, TEP aspires for the EV population in its service territory to reach 39,000 – 52,000 vehicles by 2030

EV Population Forecast as Share of Total Vehicle Population in TEP's Service Territory

2020-2030, Baseline and Low / High Impact Scenarios



Source: Guidehouse analysis Dec. 2019

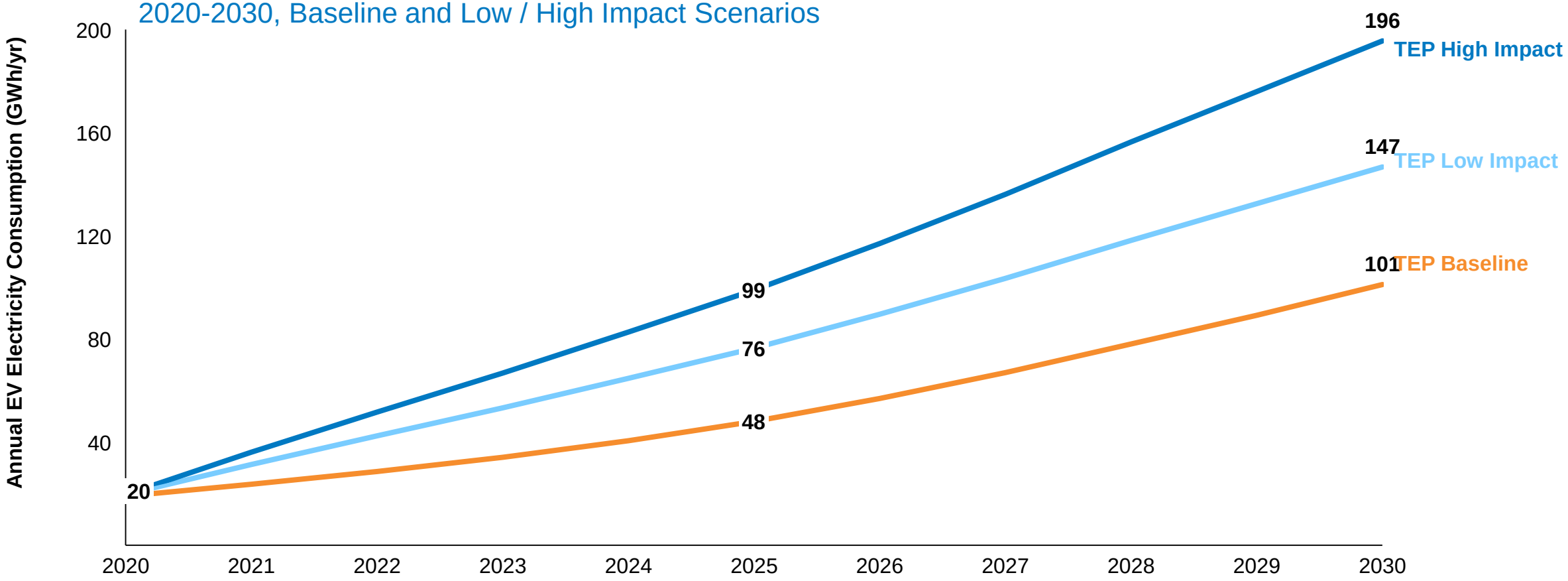
Assumptions

- The baseline EV adoption scenario expects EV share of total vehicle population to reach 2.5% in 2030 based on the assumption of no significant market intervention over the next 10 years.
- The low impact scenario expects EV share of total vehicle population to reach 3.75% in 2030 based on the assumption that the implementation of all 48 roadmap initiatives will help accelerate EV adoption in TEP's service territory.
- The high impact scenario expects EV share of total vehicle population to reach 5.0% in 2030 based on the assumption that the implementation of all 48 roadmap initiatives will help accelerate EV adoption in TEP's service territory.
- Per discussion during the January 28 Financial Working Session, the accelerated scenarios assume an annual allocation of $750,000 from 2020-2030 to administer, research, and evaluate roadmap initiatives
- The TEP charging station incentive was assumed to remain constant from 2020-2030 at 75% of the $2,000 average estimated cost per L2 charger. The incentive costs were applied to the incremental L2 chargers associated with the low and high impact scenarios

Based on benchmarking with similarly-sized metropolitan areas in the Southwest, TEP aspires for the EV population in its service territory to contribute 101–196 GWh/year by 2030

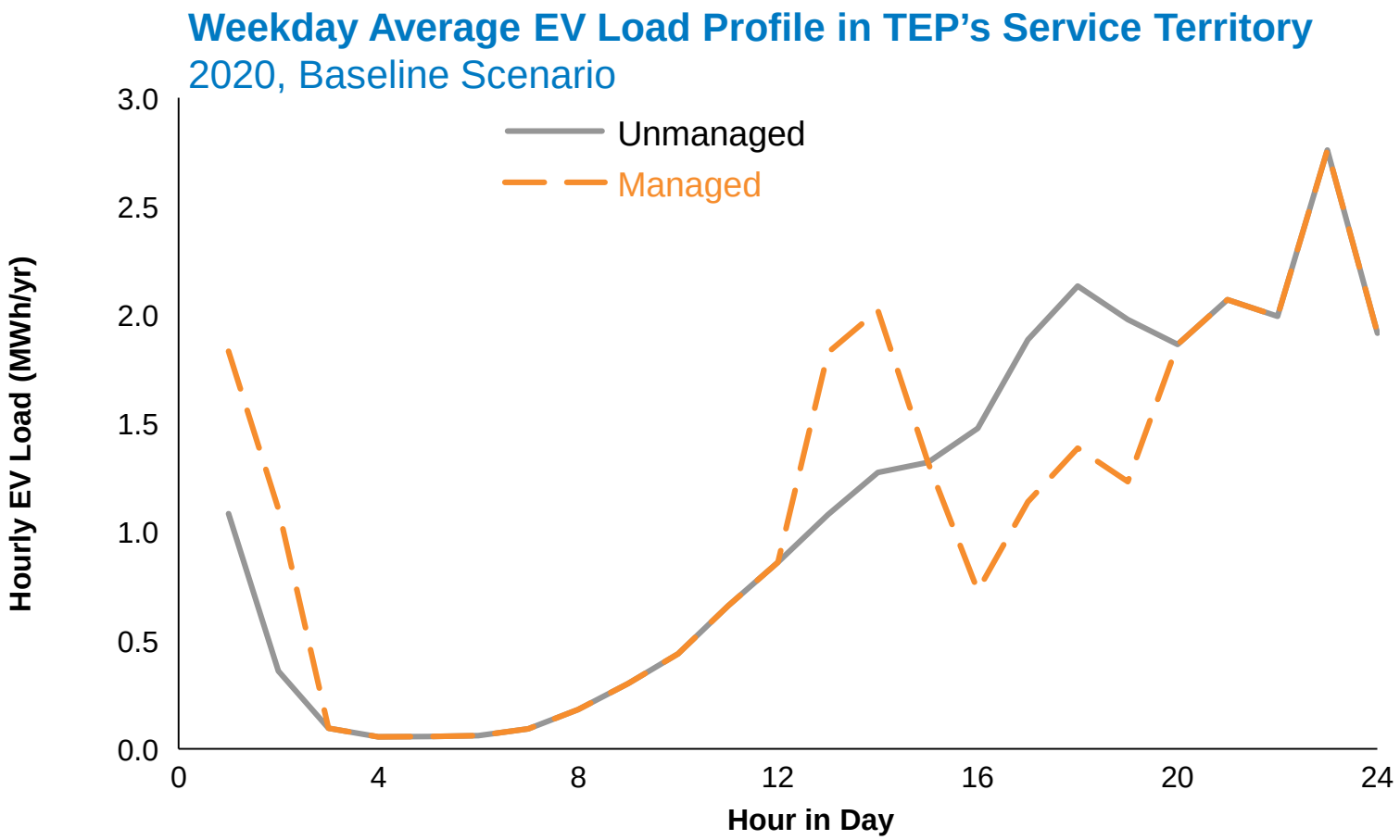
EV Annual Electricity Consumption in TEP's Service Territory

2020-2030, Baseline and Low / High Impact Scenarios



Source: Guidehouse analysis, Dec. 2019

Managing EV charging is expected to shift EV charging load from evening peak hours (3-7pm) to midday and nighttime off-peak hours (12-2pm and 12-2am)



- **Unmanaged charging load profile** assumes natural shift of EV owners to time-of-use rates, in line with Baseline Study assumptions
- **Managed charging load profile** assumes 40% of EV charging load shifts from 3-7pm to 12-2pm and 12-2am

Source: Guidehouse analysis Dec. 2019

TEP has identified challenges to overcome and developed mitigation strategies

Theme	Challenge to Overcome	Mitigation Strategy	Relevant Initiative
TEP's Internal EVolution	• TEP's resources may not be flexible enough to adjust as the EV market evolves with new technology (e.g., faster charging, inductive charging)	• Create internal working group that monitors and assesses technology on a regular basis, and reports back on any action required	• Initiatives 1.7, 1.9, 2.6, 2.7
	• TEP's internal processes may sometimes hinder EV customer experience	• Throughout roadmap implementation, reassess efficiency of internal processes and organizational structure, and adjust where needed	• Initiatives 1.3, 1.4, 1.7
	• TEP has not yet fully defined a proactive sales and marketing strategy related to EV charging infrastructure deployment	• Leverage best practices from implementation contractor and identify sales channels and resources that can support customers in EV journey	• Initiatives 1.4, 2.6, 2.7, 4.3
	• Charging infrastructure demand may increase faster than TEP's historical load growth has typically encountered	• Incorporate EV adoption scenarios into load forecasting to proactively inform grid upgrade planning in higher growth potential scenarios, both at the distribution and local circuit levels	• Initiatives 4.1, 4.2
Stakeholder Education and Engagement	• Media coverage of isolated events surrounding EV challenges may negatively impact public sentiment and support	• Maintain public relations engagement and communicate EV benefits to mitigate negative impact of isolated events (e.g., develop an EV Champions Circle of entities that reinforce TEP communications)	• Initiatives 1.6, 2.8, 3.10
	• Lack of information highlighting EV benefits to customers may further exacerbate impact of negative events	• Set up focus groups to map customer journey and showcase positive customer EV ownership stories	• Initiatives 1.6, 3.16
	• Stakeholders may be either not engaged or not aligned to a singular vision and mission for EV deployment in Southern Arizona	• Engage with partner organizations in the EV Champions Circle to create an EV partner ecosystem value chain across use cases	• Initiatives 1.6, 2.8, 3.10
Market and Regulatory	• Third-party charging infrastructure providers may deploy chargers at scale without TEP's input limiting the value that the utility can bring	• Ensure Implementation Contractor coordinates with charging infrastructure providers, offering planning tools to support cost-effective asset deployment	• Initiatives 1.7, 2.6, 2.7
	• Market evaluation and technical advances may outpace policy and regulatory bodies' traditional timeframes, limiting TEP's involvement in EV activities	• Communicate and educate policy and regulatory bodies on value for utility involvement through proof-of-concept pilot programs, and aim for higher flexibility in initiative delivery	• Initiatives 1.1, 1.3, 2.5, 2.9

Section 2

TEP EV Action

TEP's inventory of EV initiatives can be grouped into 4 opportunity areas

1 Driving Partnerships and Collaboration

Initiatives that foster collaboration across utilities, third parties, and partner organizations to align electrification efforts.

2 Driving Supportive Policies and Incentives

Initiatives that promote policies supporting EV adoption, e.g., high-occupancy vehicle lane access, building codes, rate design, incentives.

3 Driving Consumer Awareness and Education

Initiatives that empower customers in their EV purchasing decisions through targeted education, actionable tools and increased awareness.

4 Driving Charging Infrastructure Deployment

Initiatives that encourage coordinated EV infrastructure planning and accelerate deployment.

Source: TEP internal documents, TEP interviews, Guidehouse

Each opportunity area includes 10-16 initiatives

1 Driving Partnerships and Collaboration	2 Driving Supportive Policies and Incentives	3 Driving Consumer Awareness and Education	4 Driving Charging Infrastructure Deployment
1.1 TEP EV Strategic Roadmap	**2.1** Residential EV Charger Incentives	**3.1** EV Marketing & Education Plan	**4.1** EV Penetration Baseline Study
1.2 Alliance for TE Membership	**2.2** Commercial EV Charger Incentives	**3.2** TEP Fleet Electrification Experience	**4.2** TEP System Cost-Benefit Analysis Tool
1.3 EV Statewide Initiative	**2.3** Residential EV Rates	**3.3** Fleet Conversion Planning Tool	**4.3** Infrastructure Cost Estimation Tool
1.4 EV Commercial Program	**2.4** Commercial EV Rates	**3.4** School EV Pilot Program	**4.4** Standardized Workplace Charging
1.5 Cross-Marketing for Local Dealerships	**2.5** Managed Charging	**3.5** Fleet Case Study Report	**4.5** Standardized Public Charging
1.6 Consumer Focus Group & Surveys	**2.6** Workplace EV Policy Guide	**3.6** Residential EV Calculator	**4.6** Standardized MD/HD Fleet Charging
1.7 TEP Fleet EV Roadmap Partnerships	**2.7** Public Site Host & Maintenance Guide	**3.7** New EV Owner Welcome Kit	**4.7** Standardized LD Fleet Charging
1.8 EV Advocacy Group Coordination	**2.8** Renewable EV Charging	**3.8** Comprehensive Fleet Conversion Supp.	**4.8** Charging Market Assessment
1.9 Smart Cities EV Collaboration	**2.9** Second Life Battery Research	**3.9** Employee EV Program	**4.9** Standardized Multi-Family Charging
1.10 Rideshare Company Collaboration	**2.10** eFaaS Market Assessment	**3.10** Public TEP Chargers HQ	**4.10** Non-Road Elec. Opp. Assessment
1.11 Secondary Dealer Collaboration		**3.11** Ride & Drive Event Guide	
1.12 Car Rental Company Collaboration		**3.12** Electric Vehicle Catalogue	
		3.13 EV Charging Station Signage	
		3.14 Dealership Education	
		3.15 Extended Test Drive Best Practices	
		3.16 EV Showcase	

Source: TEP, Guidehouse

Key

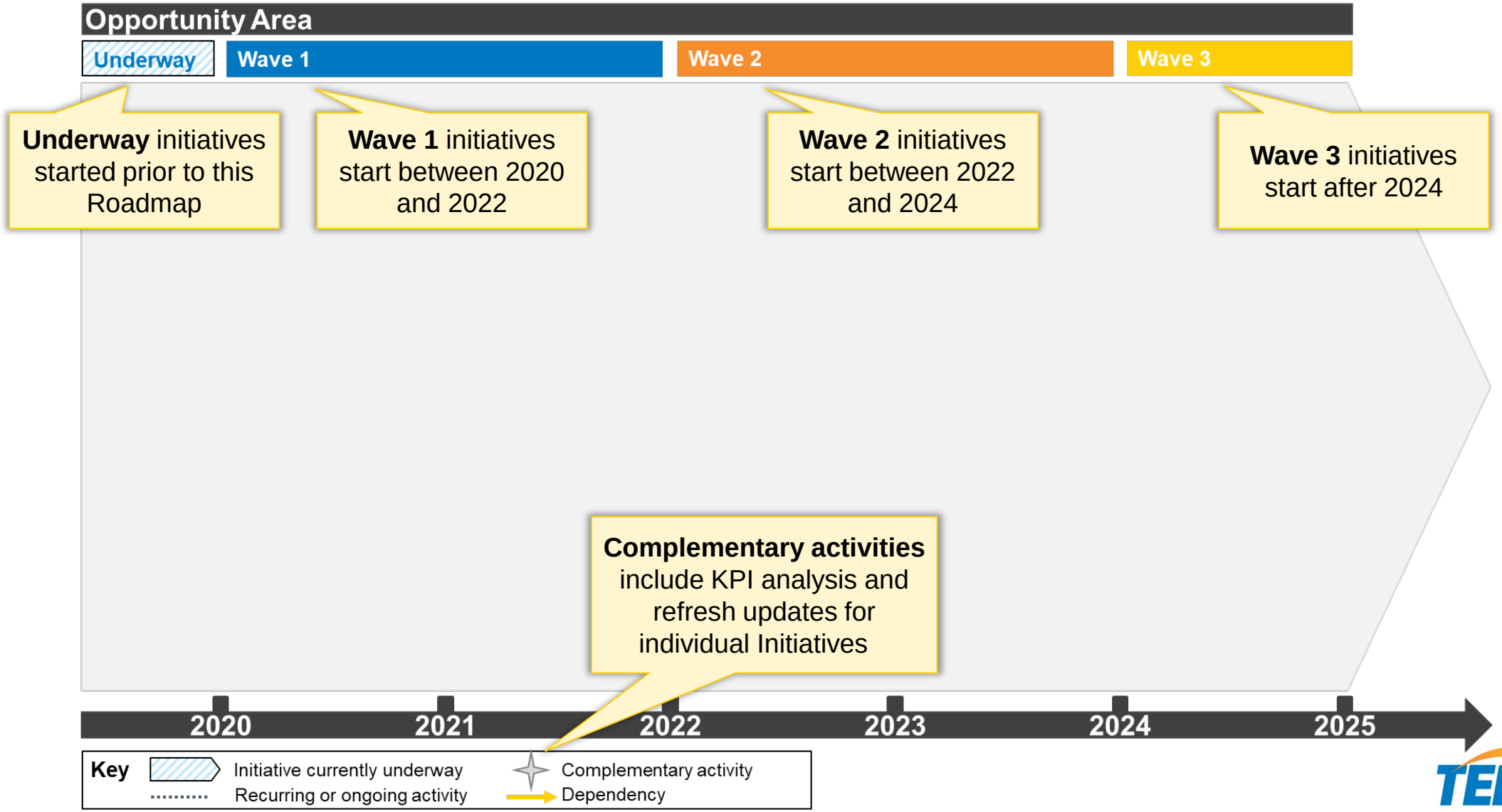
X.X Initiative currently underway

X.X New proposed initiative

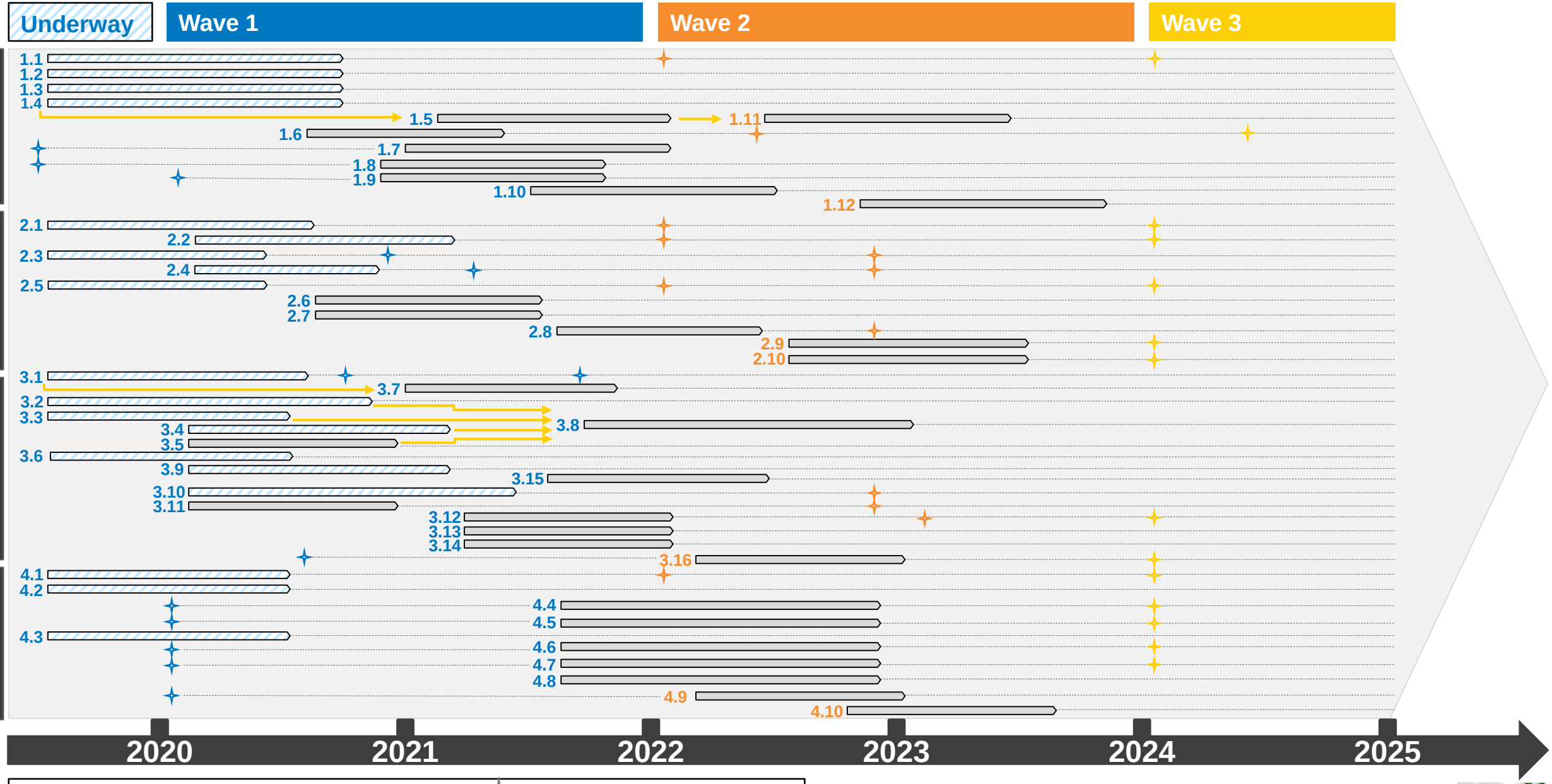
Section 3

TEP EV Roadmap

The Roadmap timeline distributes initiatives in each Opportunity Area across the next 5 years



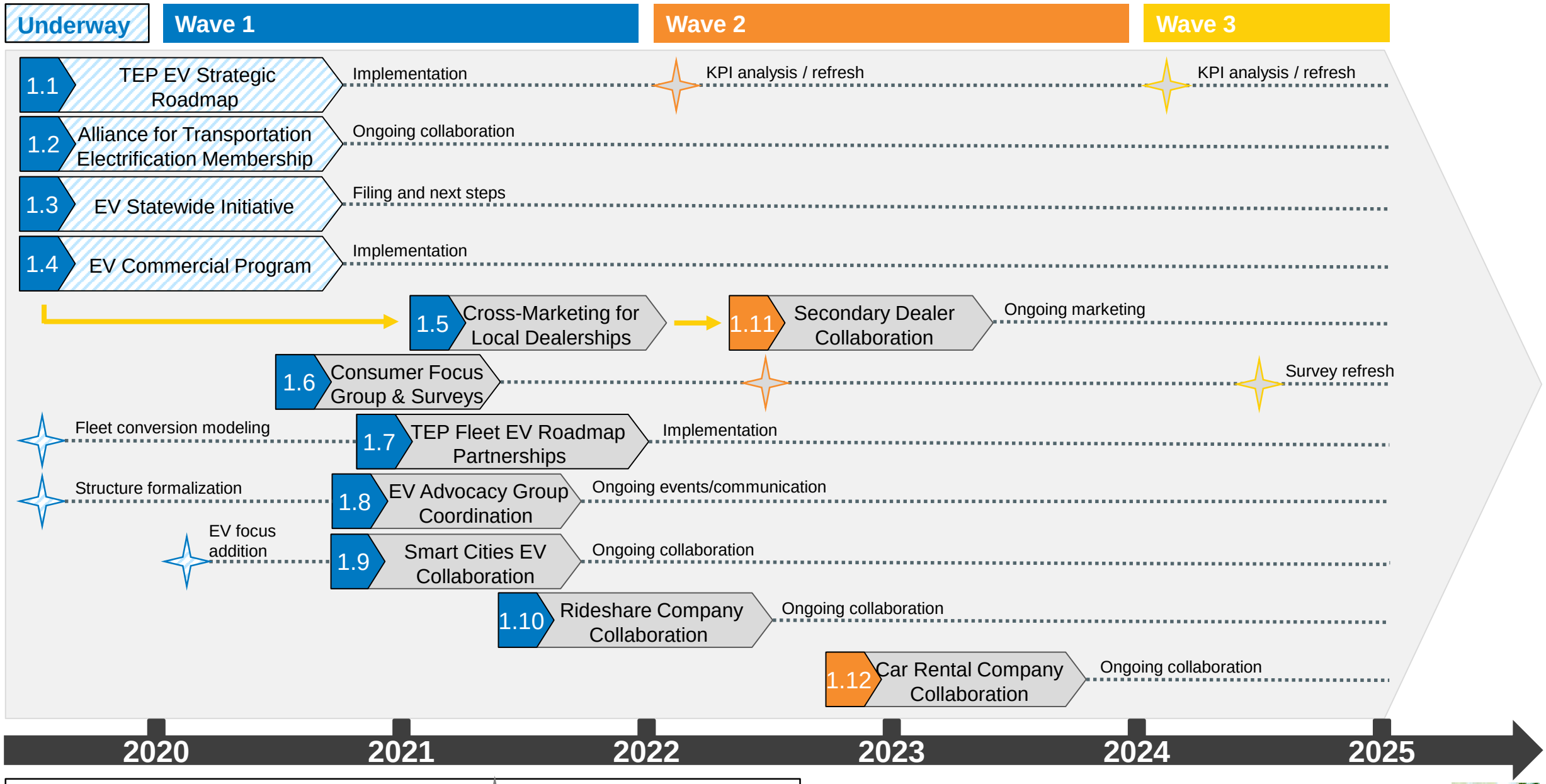
TEP EV Roadmap Timeline



Key

- Initiative currently underway
- Recurring or ongoing activity
- Complementary activity
- Dependency

1. Driving Partnerships and Collaboration



Driving Partnerships and Collaboration (1/2)

1 Driving Partnerships and Collaboration

#	Initiative	Description
1.1	**TEP EV Strategic Roadmap**	A document containing current and future initiatives, a shared vision, and a 5-year implementation roadmap
1.2	**Alliance for Transportation Electrification Membership**	A collaboration with other utilities and key industry stakeholders to advocate for “acceleration of transportation electrification in all States across the country”
1.3	**EV Statewide Initiative**	A statewide EV strategic plan in coordination with TEP, Arizona Public Service, Salt River Project, and the state of Arizona.
1.4	**EV Commercial Program**	A program supporting EV adoption through education, incentives, public-private partnerships, and infrastructure expansion
1.5	**Cross-Marketing for Local Dealerships**	A partnership with local dealerships that participate in the Dealership Education initiative to cross-market EV availability and TEP rates and charging station rebates
1.6	**Consumer Focus Group & Surveys**	A survey to collect consumer preference data to better understand the needs of transit agencies, fleet owners and individuals in Southern Arizona

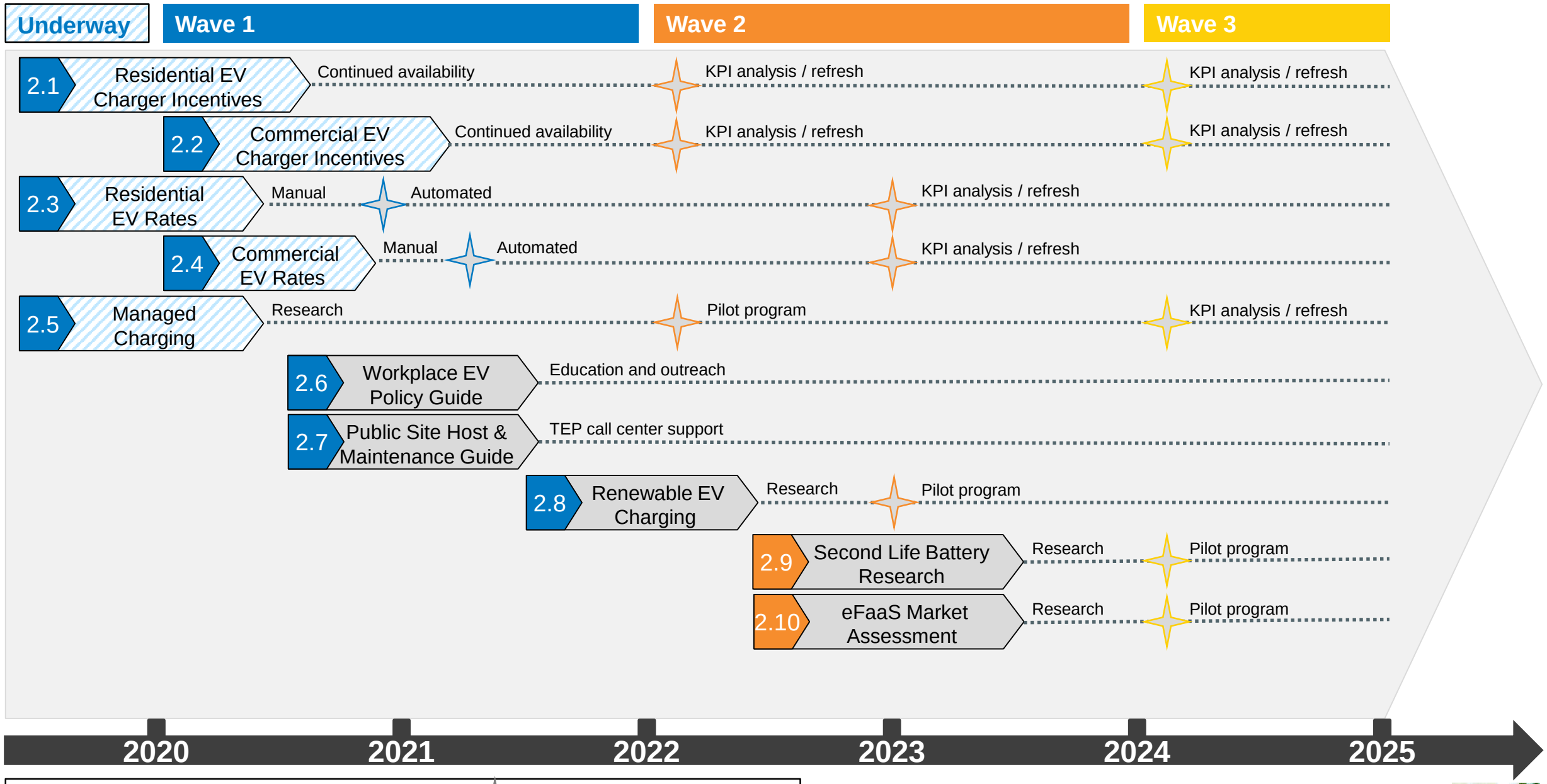
Where appropriate, initiatives will include a carve-out aimed at disadvantaged communities

Driving Partnerships and Collaboration (2/2)

1	Driving Partnerships and Collaboration	
#	**Initiative**	**Description**
1.7	**TEP Fleet EV Roadmap Partnerships**	An internal roadmap for TEP to electrify its own fleet partnering with EV manufacturers and EV charging providers
1.8	**EV Advocacy Group Coordination**	Coordination with Southern Arizona EV advocacy groups, such as TEVA and owners clubs, to distribute information on EV initiatives and provide support for EV events
1.9	**Smart City EV Collaboration**	A collaboration with Smart Cities Coalition, which will include a guide to help local communities encourage EV adoption
1.10	**Rideshare Company Collaboration**	A collaboration with rideshare companies to identify opportunities to increase the penetration of EVs in rideshare fleets, e.g., leveraging TEP's charging infrastructure
1.11	**Secondary Dealer Collaboration**	A partnership program with used car dealerships and platforms to promote used EV sales in Southern Arizona
1.12	**Car Rental Company Collaboration**	A collaboration with car rental companies to explore how to expand EV availability in rental fleets or offer rental vouchers for customers who purchase an EV

Where appropriate, initiatives will include a carve-out aimed at disadvantaged communities

2. Driving Supportive Policies and Incentives



Driving Supportive Policies and Incentives (1/2)

2	Driving Supportive Policies and Incentives	
#	**Initiative**	**Description**
2.1	**Residential EV Charger Incentives**	The program rebates customers who install EV chargers and switch to an EV tariff rate plan and builders to have homes pre-wired for EV charging stations to be installed later
2.2	**Commercial EV Charger Incentives**	A program where TEP will offer rebates for L2 and DC chargers. Projects must be sub-metered and ratepayer will adopt a TOU rate
2.3	**Residential EV Rates**	Two residential EV charging rates were approved with the aim of encouraging charging during super off-peak periods
2.4	**Commercial EV Rates**	There are two commercial rates under development, one for fleets and another for DC fast charging
2.5	**Managed Charging**	An initiative to investigate managed EV charging with the goal of informing TEP strategy, and potential pilot program for vehicle-grid integration applications
2.6	**Workplace EV Policy Guide**	A guide, leveraging ongoing educational programs, to help local businesses deploy workplace charging and implement commuter benefit policies, including information on available incentives and rates

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

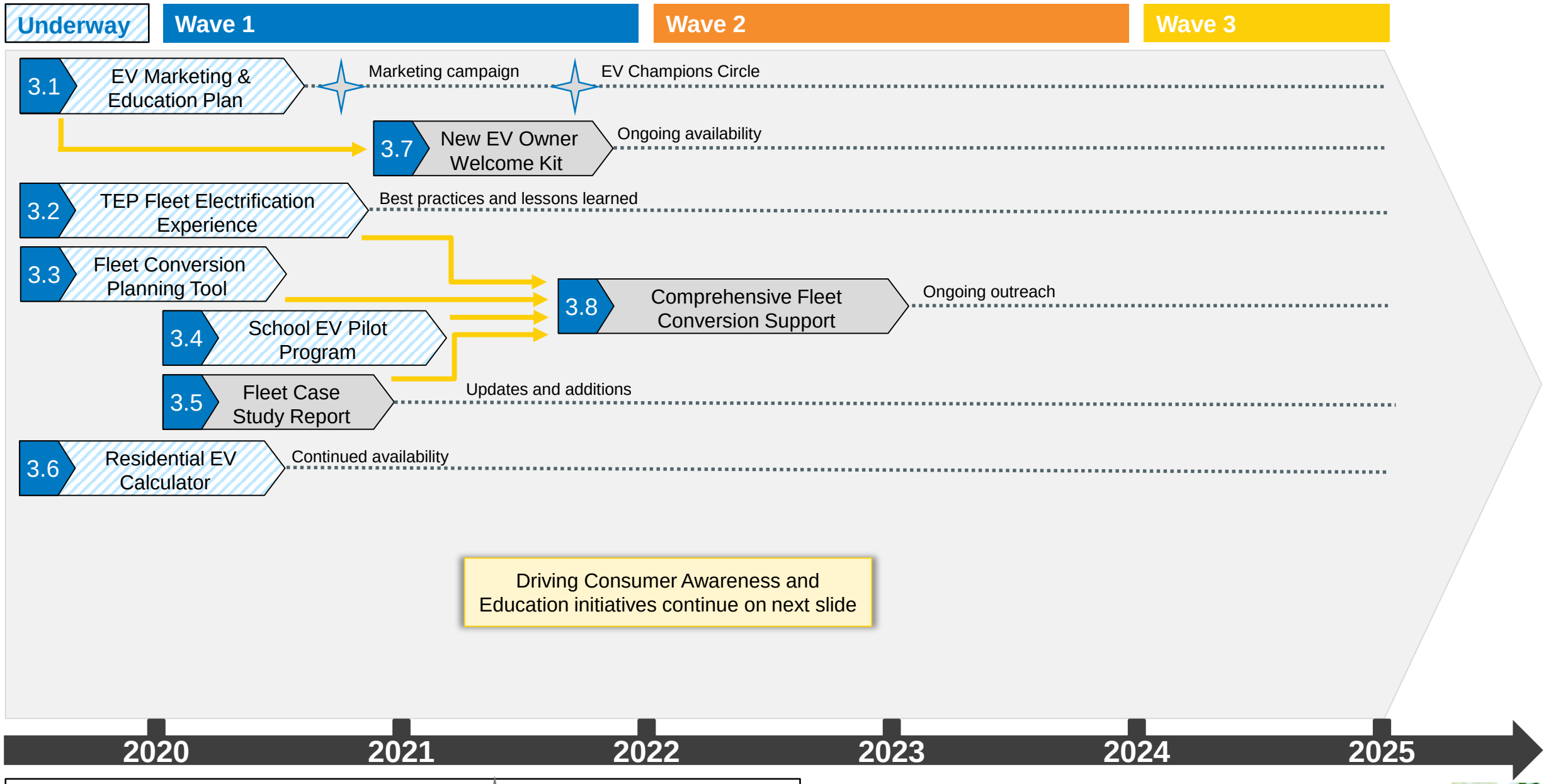
Driving Supportive Policies and Incentives (2/2)

2 Driving Supportive Policies and Incentives

#	Initiative	Description
2.7	**Public Site Host & Maintenance Guide**	A guide on “How to be an Public EV Charging Site Host” including recommended maintenance specifications and best practices
2.8	**Renewable EV Charging**	A pilot program to capture synergies between solar generation and EV chargers that will certify charging stations that consume green power
2.9	**Second Life Battery Research**	A study investigating second-life use cases for EV batteries after they are retired from the vehicle and exploring purchasing options for EV battery rights
2.10	**eFaaS Market Assessment**	A study to evaluate opportunities and market size for electric Fleet-as-a-Service in Southern Arizona

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

3. Driving Consumer Awareness and Education (1/2)



3. Driving Consumer Awareness and Education (2/2)

Underway | Wave 1 | Wave 2 | Wave 3

Driving Consumer Awareness and Education initiatives start on prior slide

- 3.9 Employee EV Program — Continued availability
- 3.15 Extended Test Drive Best Practices
- 3.10 Public TEP Chargers HQ — Implementation — Refresh
- 3.11 Ride & Drive Event Guide — Support/attend events — Refresh
- 3.12 Electric Vehicle Catalogue — Market update — Market update
- 3.13 EV Charging Station Signage — Refresh
- 3.14 Dealership Education — Ongoing education
- Preliminary events — 3.16 EV Showcase — KPI analysis

2020 | 2021 | 2022 | 2023 | 2024 | 2025

Key

- Initiative currently underway
- Recurring or ongoing activity
- Complementary activity
- Dependency

Driving Consumer Awareness and Education (1/3)

3	Driving Consumer Awareness and Education	
#	**Initiative**	**Description**
3.1	**EV Marketing & Education Plan**	A plan to develop an EV Champions Circle of entities that reinforce TEP communications and establish a marketing campaign for EV initiatives, incentives, rates, and events
3.2	**TEP Fleet Electrification Experience**	An effort to accelerate the electrification of the UNS Energy Fleet
3.3	**Fleet Conversion Planning Tool**	A tool that will facilitate fleet EV ownership by providing estimates for total cost of ownership
3.4	**School EV Pilot Program**	A pilot that will provide funding for charging stations, energy efficiency measures in schools, and classroom education
3.5	**Fleet Case Study Report**	A case study report with best practices and lessons learned from customers who successfully used the Fleet Conversion Planning Tool
3.6	**Residential EV Calculator**	A tool that will facilitate residential EV ownership by providing estimates for total cost of ownership

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

Driving Consumer Awareness and Education (2/3)

3	Driving Consumer Awareness and Education	
#	**Initiative**	**Description**
3.7	**New EV Owner Welcome Kit**	An initiative to provide an ‘everything you need to know’ packet to new EV owners
3.8	**Comprehensive Fleet Conversion Support**	A program to educate key accounts, such as last mile freight companies, and state/local governments on EV fleet conversion and charging infrastructure considerations
3.9	**Employee EV Program**	A program supporting TEP employee purchase of EVs through incentives, educational materials, extended test drive, and workplace chargers
3.10	**Public TEP Chargers HQ**	TEP will provide publicly available EV chargers at TEP’s headquarters
3.11	**Ride & Drive Event Guide**	A toolkit/guide for hosting EV ride and drive events
3.12	**Electric Vehicle Catalogue**	A catalogue of electric vehicle options and sales contacts to support transportation electrification, leveraging resources such as Alternative Fuels Data Center (AFDC)

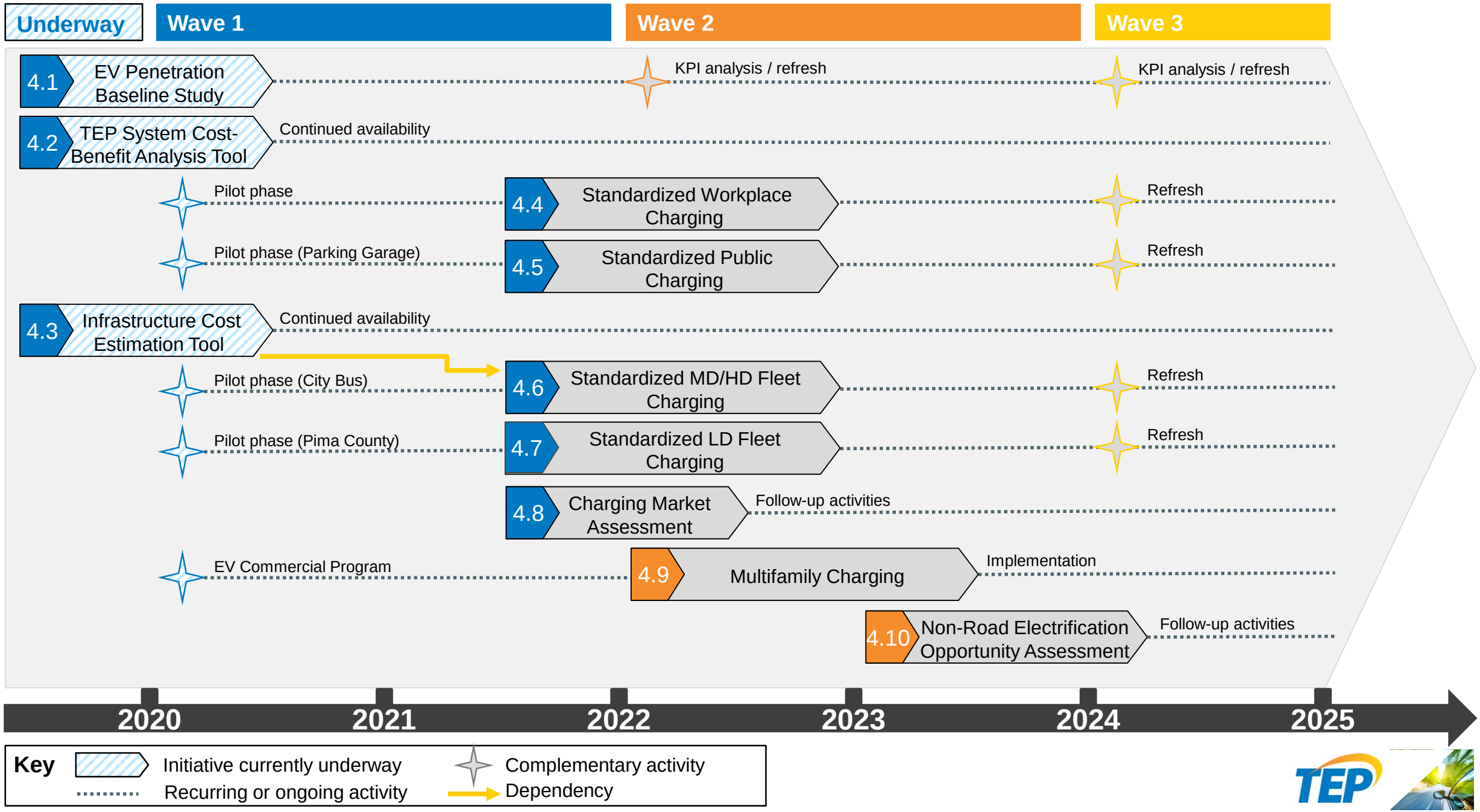
Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

Driving Consumer Awareness and Education (3/3)

3	Driving Consumer Awareness and Education	
#	**Initiative**	**Description**
3.13	**EV Charging Station Signage**	A program to provide best practices on how to improve visibility and public awareness of EV charging stations including resources for location and availability
3.14	**Dealership Education**	A program to educate local dealerships on EV ownership, EV rates/incentives, and other strategies to accelerate EV sales, e.g., kiosks
3.15	**Extended Test Drive Best Practices**	A program to communicate best practices and lessons learned from the TEP Employee Program to support customer extended test drive programs
3.16	**EV Showcase**	An initiative to explore options for an EV Showcase or mobile showcase

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

4. Driving Charging Infrastructure Deployment



Driving Charging Infrastructure Deployment (1/2)

4 Driving Charging Infrastructure Deployment

#	Initiative	Description
4.1	EV Penetration Baseline Study	The study will develop an EV adoption forecast, charging port siting, and load analysis forecast for TEP's service territory
4.2	TEP System Cost-Benefit Analysis Tool	A cost-benefit analysis framework that will evaluate EV charging infrastructure projects on a case-by-case basis
4.3	Infrastructure Cost Estimation Tool	The tool includes a screening checklist and a cost estimator for customers requesting charging infrastructure
4.4	Standardized Workplace Charging	An initiative to support and expand standardized workplace EVSE deployment across Tucson, leveraging experiences from relevant pilot programs
4.5	Standardized Public Charging	An initiative to support and expand standardized public EVSE deployment across Tucson, leveraging experiences from relevant pilot programs, e.g., Parking Garages
4.6	Standardized MD/HD Fleet Charging	A project to support and expand standardized fleet electrification efforts by organizations in Tucson, leveraging experiences from relevant pilot programs, e.g., City Bus

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

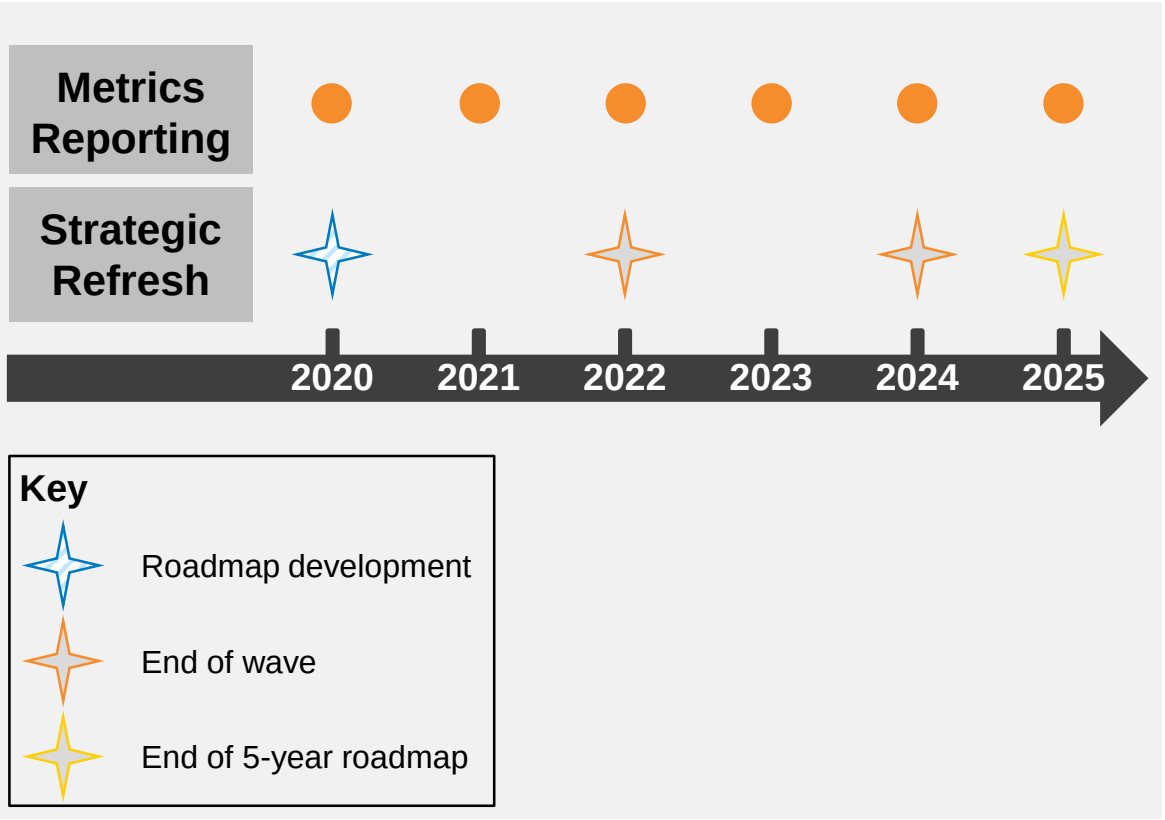
Driving Charging Infrastructure Deployment (2/2)

4	Driving Charging Infrastructure Deployment	
#	**Initiative**	**Description**
4.7	**Standardized LD Fleet Charging**	An initiative to support and expand standardized LD fleet electrification efforts by organizations in Tucson, leveraging experiences from relevant pilot programs, e.g., Pima County, Park Police
4.8	**MD/HD Charging Market Assessment**	A study, leveraging insights from Sun Tran Project, that will study infrastructure needs for MD/HD EVs, focusing on understanding grid considerations and impacts
4.9	**Standardized Multifamily Charging**	An initiative to expand standardized public charging for multi-family dwellings
4.10	**Non-Road Electrification Opportunity Assessment**	An assessment to evaluate potential non-road electrification opportunities that can leverage existing transportation electrification efforts

Where appropriate initiatives will include a carve-out aimed at disadvantaged communities

TEP plans to track Roadmap progress through metrics reporting and strategic refresh

Progress Tracking Timeline



Process

- **TEP plans to undertake all 48 initiatives** in the roadmap to support accelerated EV adoption in Southern Arizona
- TEP will review the Roadmap on a regular basis, **refreshing projects, re-thinking the timeline, addressing new challenges, and reporting on its accomplishments**.
- TEP will report metrics annually to track Roadmap progress towards its overall goals.
- Over the 5-year planning horizon, some significant changes are expected as **the industry continues to grow and evolve.**
- While the Roadmap positions Southern Arizona to meet these challenges, it will be adapted at the end of each initiative wave and the end of the Roadmap to **address the changing environment through a strategic refresh process**.
- The timeline, including the initiative waves, will be revised accordingly.
- As the market evolves and uncertainties become better understood with time, conservative assumptions around the **Value of Pursuing the Roadmap will be updated**.

Appendix

Glossary

Acronym	Definition
OEM	Original Equipment Manufacturer (automaker)
EVSE	EV Supply Equipment
LD	Light Duty
MD	Medium Duty
HD	Heavy Duty
DOI	Department of Insurance
DOT	Department of Transportation
ACA	Arizona Commerce Authority
DEQ	Department of Environmental Quality
TCCC	Tucson Clean Cities Coalition
COG	Council of Governments
TEVA	Tucson Electric Vehicle Association
MPO	Metropolitan Planning Organization
TMA	Transportation Management Area