Electrification of Vehicles in SMUD's 2030 Zero Carbon Plan

Lora Anguay, Chief Zero Carbon Officer

Powering forward.
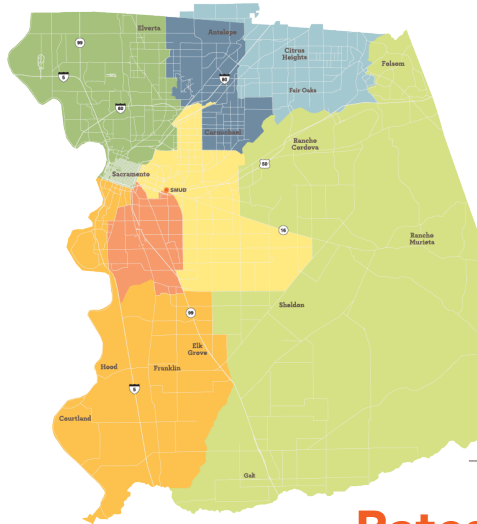Together.

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Climate Emergency Declaration

SMUD, and regional agencies recognize that we're facing a climate crisis and must act.

American Lung Association gives the region an **"F"** for air quality.*

Rising temperatures have an adverse impact on the economy.

Regional air quality is a serious concern.

Local childhood asthma rates are about **22%** higher than the national average.**

Jobs and inclusive community development.

Opportunity for collaboration to strengthen our regional economy.

Reduce droughts, wildfires and severe weather.

Improved health and regional air quality.

Address environmental inequities.

Attract innovation and investments to the region.

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Flexible pathway to zero carbon

Natural gas generation repurposing

Retire 2 power plants by 2025 and retool remaining 3 to minimize emissions

Proven clean technology

Expand SMUD's renewable and battery storage resources by 3.5x

>3,000 MW of new renewable energy & storage – equivalent to energy needs of more than 600,000 homes

Support customer resources
Growing rooftop solar and batteries

90% reduction of greenhouse gas emissions

New technology & business models

Pilot & scale new projects and programs
- 2x savings from energy efficiency & building electrification
- Education & demand flexibility
- Virtual power plants & vehicle-to-grid technology
- New grid-scale technologies

Financial
- Pursue grants & partnerships
- Limit rate impacts to rate of inflation

Maximize community benefits
- Keep affordable rates & reliable power
- Improve local air quality & overall community health
- Reduce related impacts of carbon – drought, wildfires & extreme weather
- Create thousands of new tech jobs
- Strengthen all communities
- Support under-resourced communities
- Involve our customers & community in this transition

Goal:

Eliminate CO$_2$ from SMUD's power supply

CO$_2$

100%

Zero carbon by 2030

~$2.5 billion investment

Thousands of new regional clean tech jobs

Why Electric Vehicles

Electric Vehicles improve air quality, lower carbon emissions and support local economic/equity job growth
- Transportation is the largest source of Criteria and GHG emissions in the state
- Clean electricity from SMUD's Zero Carbon Plan can create a zero-emission solution
- Better air quality will improve regional health

Transportation electrification partnerships will bring new jobs and equity workforce development to support our community and improve quality of life

State and Federal policies support clean transportation, environmental and equity goals
- $10B State and $7.5B Federal policy

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Electric Vehicle Goals – Medium + Heavy Duty

Forecasted Medium/Heavy Duty
EV Growth to 2030
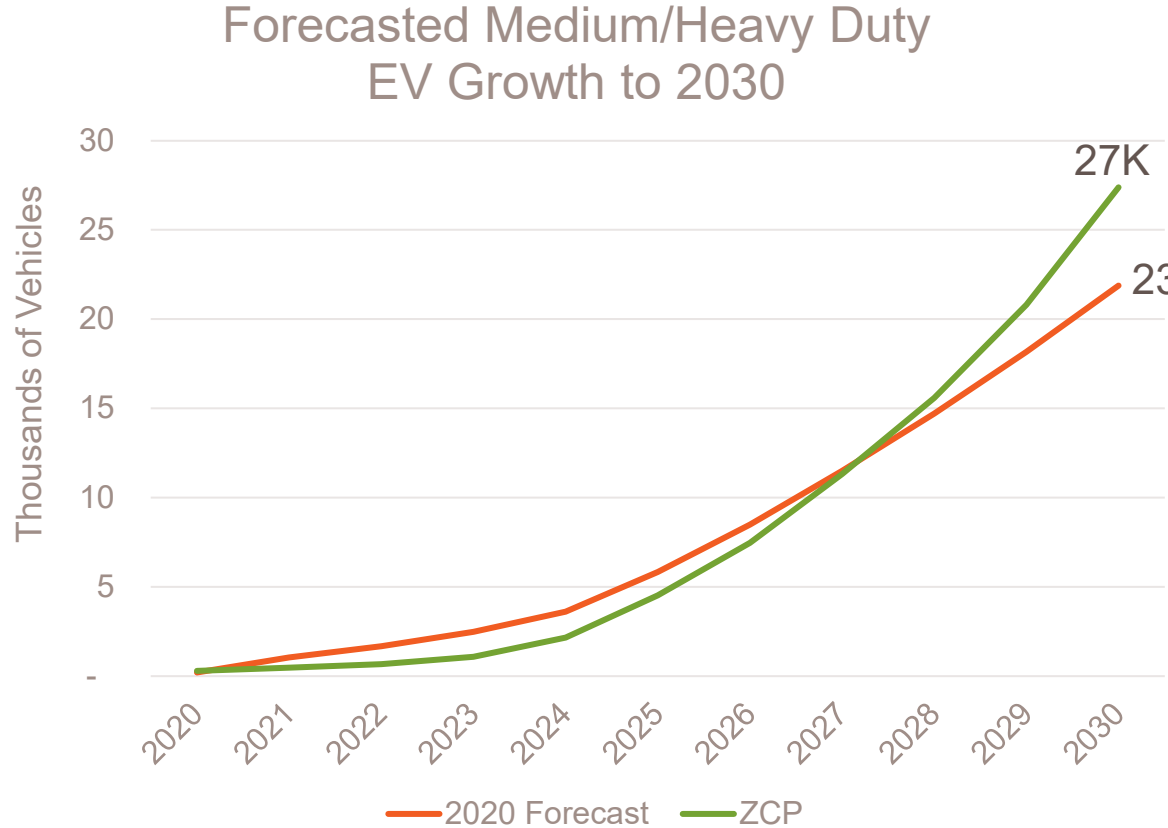
SMUD's zero carbon plan goal

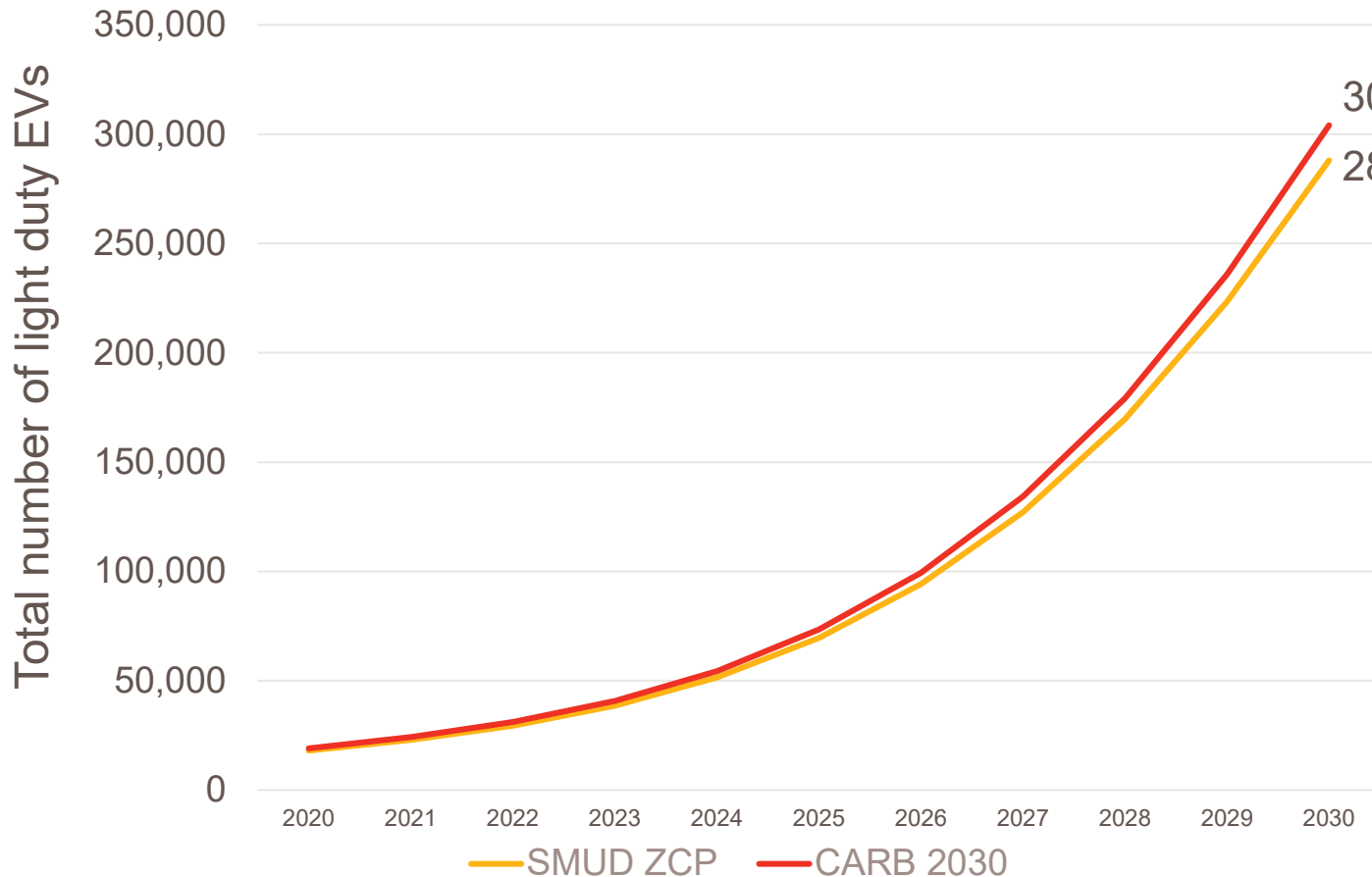Local estimate based on State policy goals

Medium/Heavy Duty vehicles at the end of 2021: **117*** **(estimated)**

Goals represent about a 60x increase in Medium/Heavy Duty electric vehicles by 2030

*Excludes forklifts and truck refrigeration units

Electric Vehicle Goals – Light Duty

Forecasted Light-duty EV Growth

- CARB 2030 Scoping Plan local estimate for 8,000,000 statewide cars by 2030

- SMUD zero carbon plan goal

- Actual population of Light-Duty EVs at end of 2021: **23,576**

- Goals represent a 12x increase in light duty vehicles by 2030

- CARB 2030 Scoping Plan is not a regulatory requirement

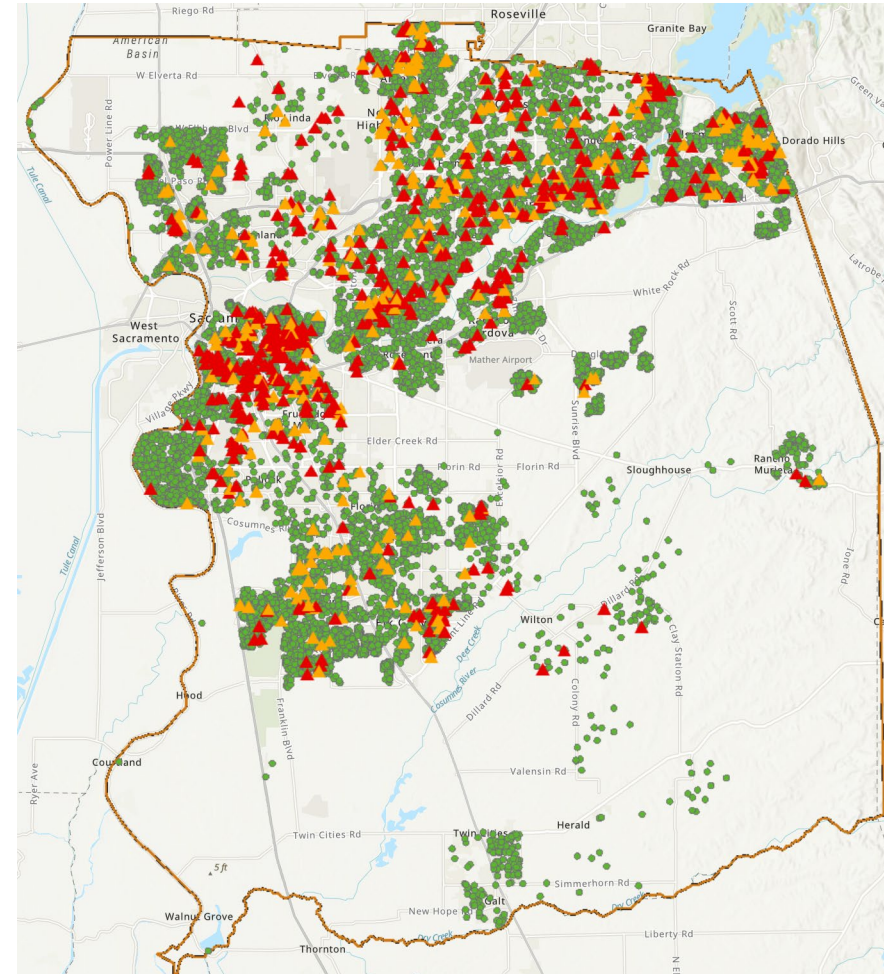# 2022 Distribution System Impacts due to EV

10,142 TXs with self-reported EVs (green dots)

509 overloaded TXs (red triangles)

Overloading criteria:

- ✓ 140% for 1 hour
- ✓ 124% for 2 hours
- ✓ 112% for 4 hours
- ✓ 106% for 8 hours

317 TXs loaded at 80-100% (orange triangles)

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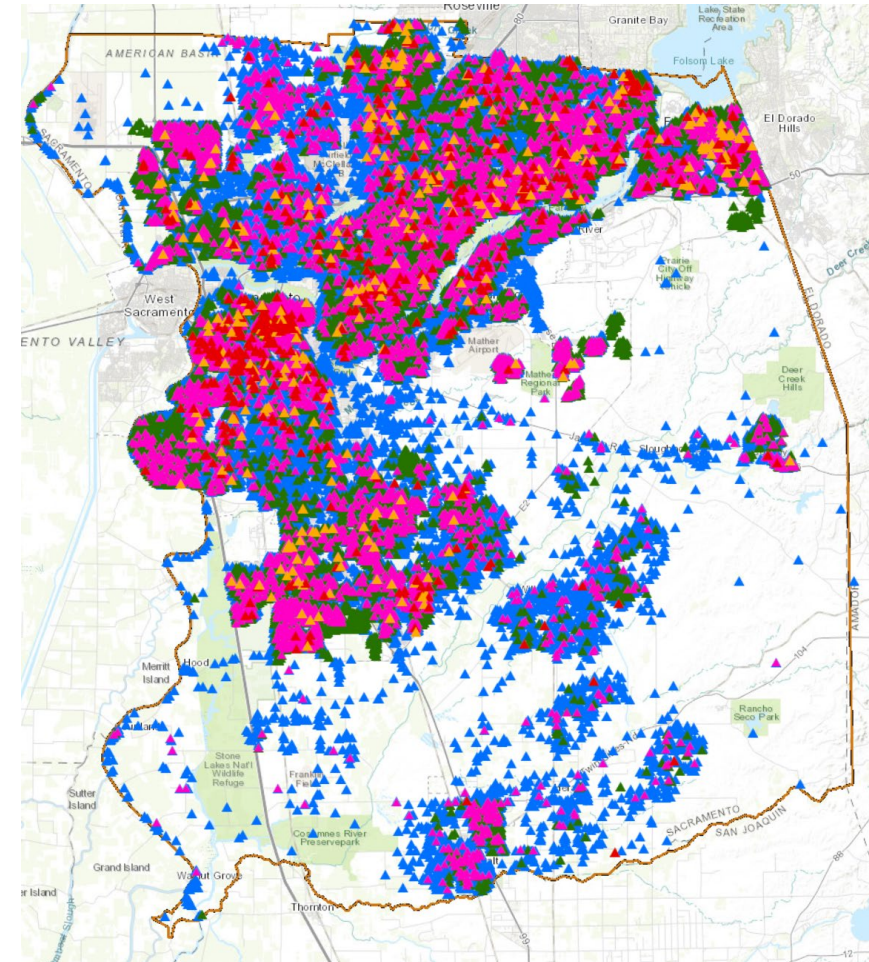# 2030 Forecasted Distribution System Impacts

Projected impacts:

Green – 2022 TXs with EVs

Red – 2022 overloaded TX due to EVs

Blue – 2030 TXs with EVs (not overloaded): 40965

Pink – 2030 overloaded TX due to EVs: 5755

Electric Vehicle Strategy – 6 Objectives

Grid & Charging Infrastructure

Accelerate grid and charging infrastructure to achieve 2030 electric vehicle goals

Customer Education & Experience

Customers contact SMUD first as their trusted advisor and partner to seamlessly transition to electric mobility

New Technology/ Innovation

Embrace innovation to optimize customer investments that increase value for customers and the grid

Equitable Access

Provide equitable access to affordable clean mobility

Workforce

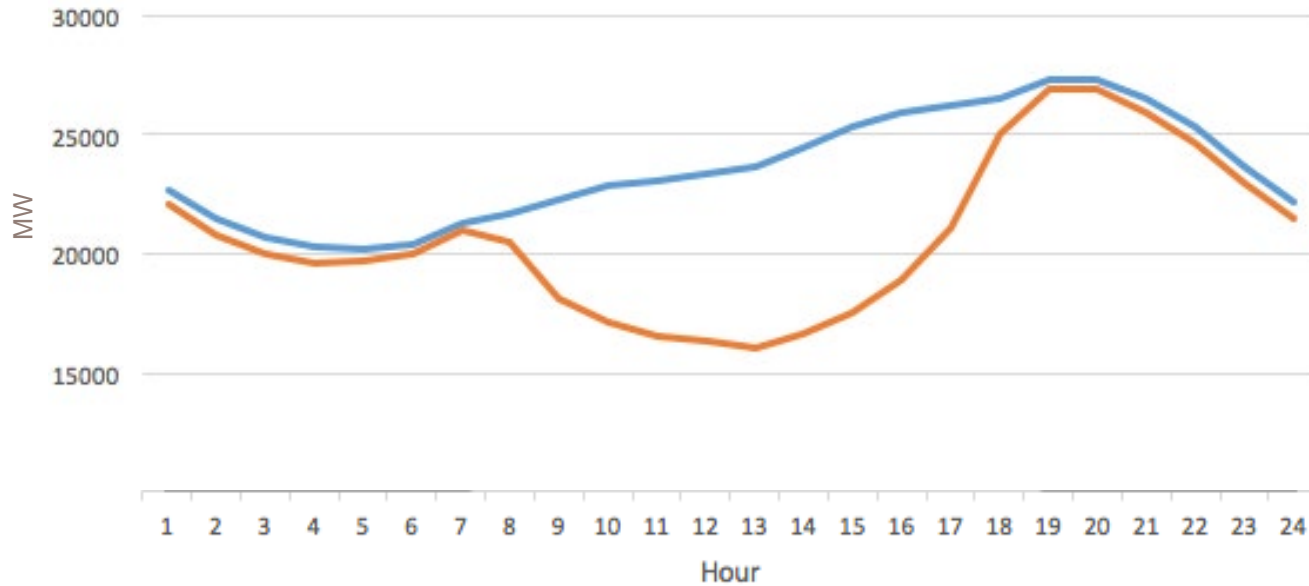Robust workforce development supporting equity job creation

Regional Collaboration & Investment

Work with regional partners to secure new investments and grants

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Vehicle to Grid charge/discharge opportunities (V2G)

Intra-day operation (in relation to the duck curve)

Inter-day operation (for reliability)

- Typical EVs cycle ~20% of SOC for daily driving (~10 kWh/day from 60 kWh battery)

- Typical solar paired batteries use ~65% of SOC for daily rate arbitrage (~6.5 kWh/day from 10 kWh battery)

- V2G is a better candidate for holding inter-day charging & discharging function than solar paired batteries without impacting customer utility

- Inter-day / long duration energy storage was a reliability gap identified in the Zero Carbon Plan
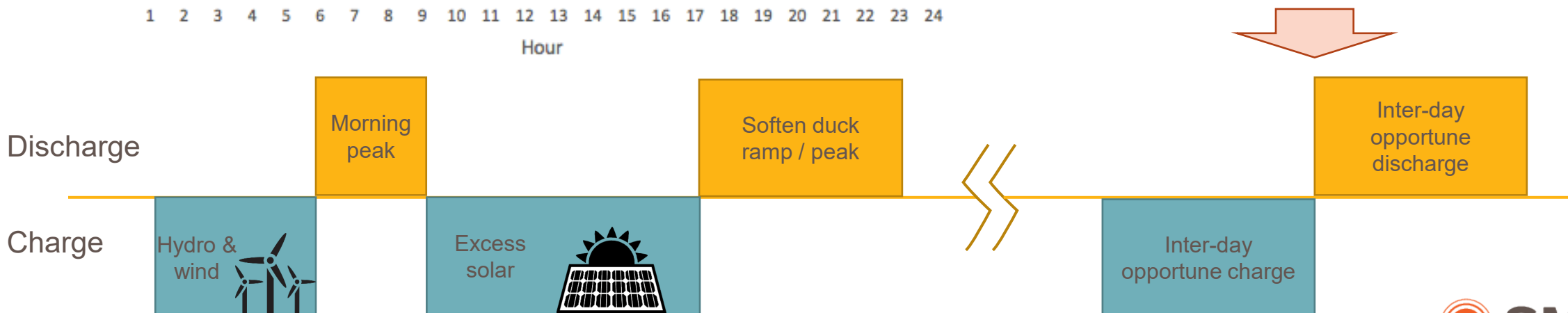
Vehicle to Grid Activities

EV Charging Pilot with Ford, BMW and General Motors
- Pilot program launched in 2022
- Demonstrate avoiding transformer overloading
- Improve use of surplus daytime solar energy

Expand electric school bus program
- Partnered with Twin Rivers Unified School District, Ford & Cadmus
- Vehicle to Grid school buses at three additional schools

Bi-directional charging research
- Planning to demonstrate residential Vehicle to Grid in 2023
- Position research to secure grant funding

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Thank you