Ready, Set Charge!

Decision Making for EV Charging in Multiple Family Dwellings:

Technology

TIM MILBURN

GREEN WAYS 2GO

January 29, 2026

EV Charging in MFDs

BASELINE TERMS

comed
AN EXELON COMPANY

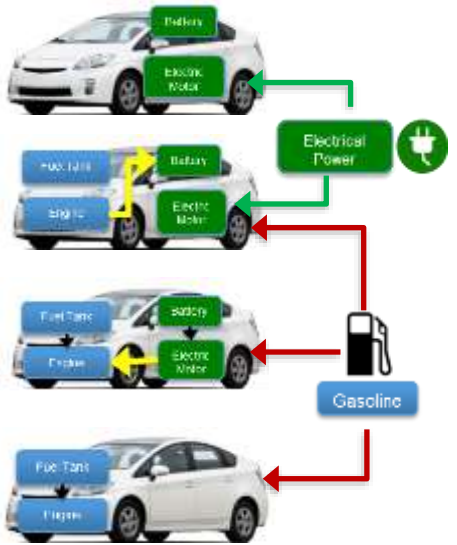
Key Vehicle Terms

- **PEV = Plug in Electric Vehicle**
  - Primary or only fuel is electricity
  - **Commonly called "EV"**
  - **BEV = Battery Electric Vehicle (BEV)**

  PHEV = Plug-in Hybrid Electric Vehicle

- **HEV = Hybrid Electric Vehicle**
  - Primary fuel is fossil fuel
  - Fuel economy from regenerative braking
  - On Board battery energy storage

- **ICEV = Internal Combustion Engine Vehicle**
  - Primary fuel is fossil fuel

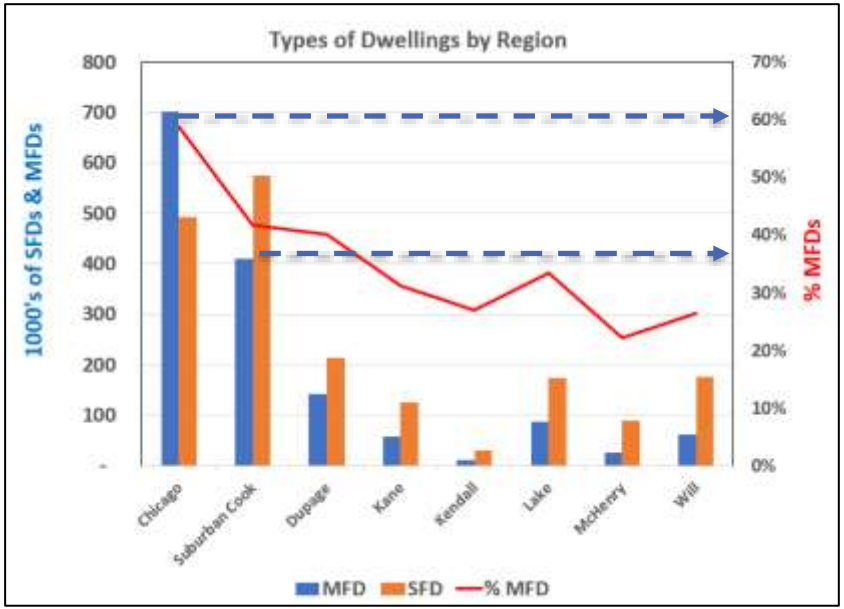


MFD Focus

comed
AN EXELON COMPANY

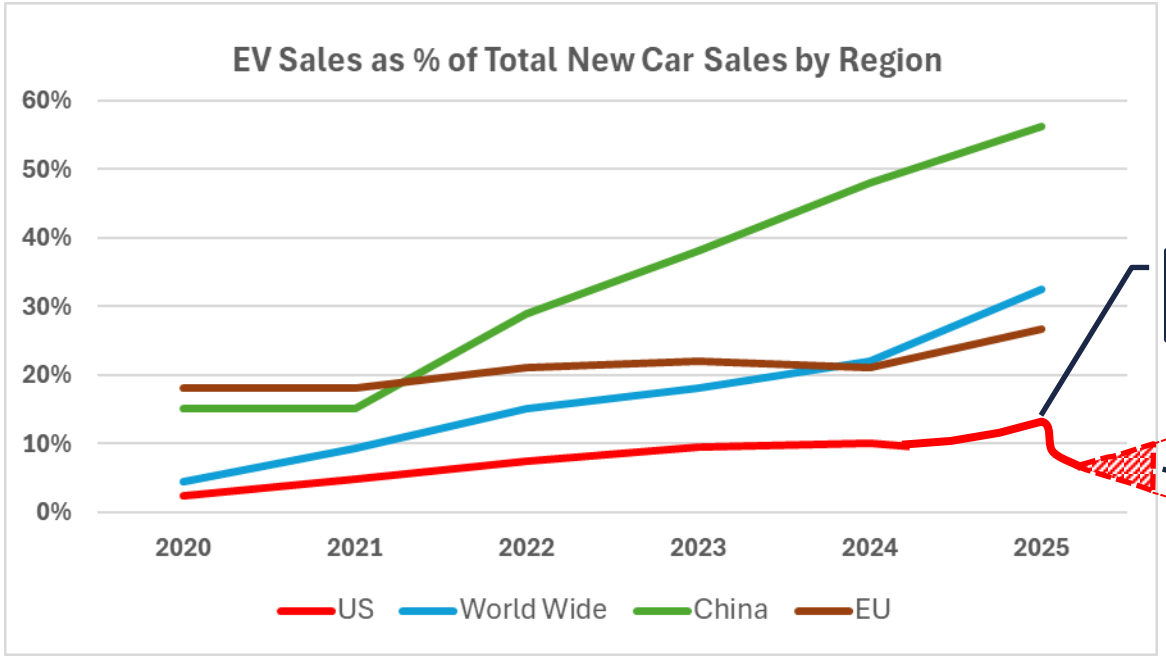
Multiple Family Dwelling (MFD): EV CHARGING DEMAND

1. People in MFDs:
   - Want ability to charge at home
   - At-home access to EV charging is challenging
2. Significant portion live in MFDs
   - Chicago: 60% in MFDs[2]
   - Suburban Cook Cty.: 37% in MFD[2]
   - US: > 30% in MFD



comed™
AN EXELON COMPANY

EV Sales History By Region



2025 EV Counts:
US: 4.1 million
Illinois: 163,000

Source: Tracking global data on electric vehicles - Our World in Data

comed™
AN EXELON COMPANY

Useful Terms and Classifications

MFD MARKET AND EV CHARGING

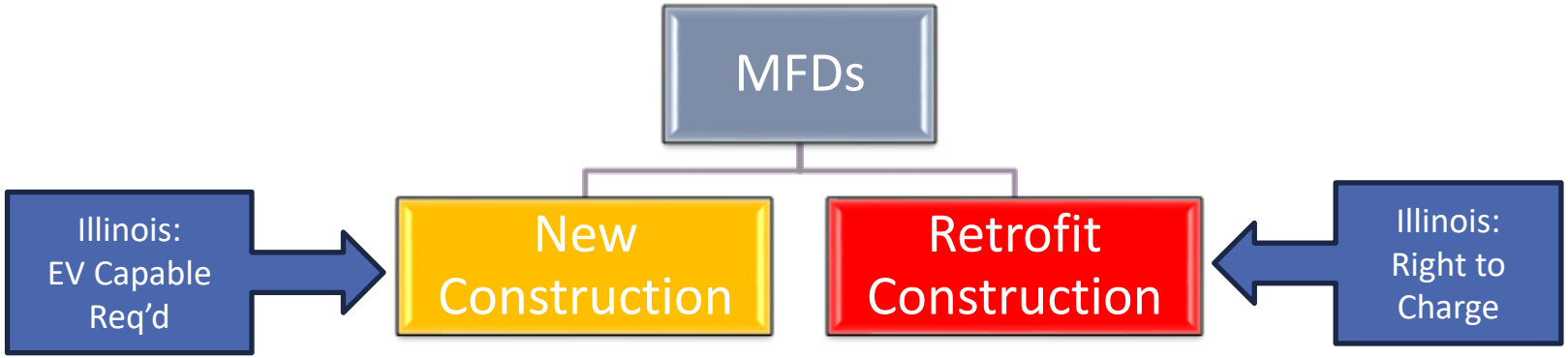
Key Occupancy Type Terms

- MFD = Multiple Family Dwelling
  - Aka Multi-family Dwelling, MUD = Multiple Unit Dwellings
- SFD = Single Family Dwelling
  - Aka SFR = Single Family Residence

Key EV Charging Terms

- **EVSE** = EV Supply Equipment = EV Charging Stations
- **OBC** = On Board Charger – device **on** EV that controls battery charging
- **EVCI** = EV Charging Infrastructure
- **EVCS** = EV Charging Solutions

MFD Construction



EV Charging Act IL SB004 – after Jan 1 2024,

- SFD and small MFD: at least one EVSE
- Large ***MFD***: **100%** EV Capable
- Affordable housing will require 40% EV Capable up to 70% EVC (2033) – new construction

3:1 to 5:1 cost ratio for retrofit vs. new construction[1]

EV Charging Act IL SB004

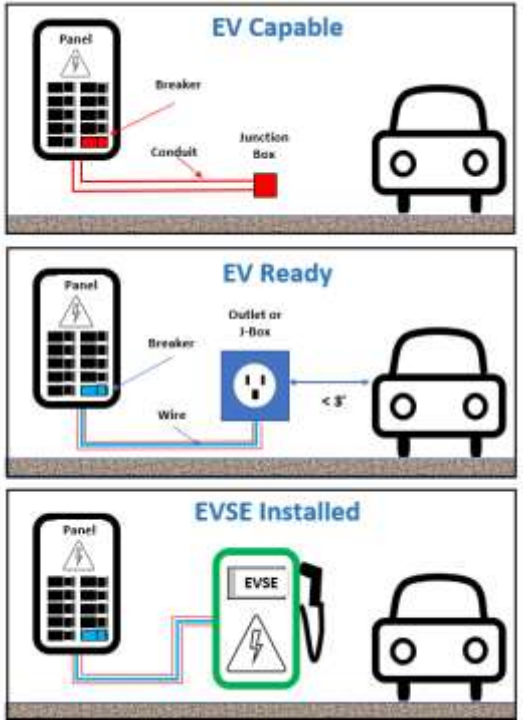
- All MFD residents have right to install EV charging

1: EV Charging for Residential and Commercial Energy Codes, US Dept of Energy, 2016

comed™ AN EXELON COMPANY

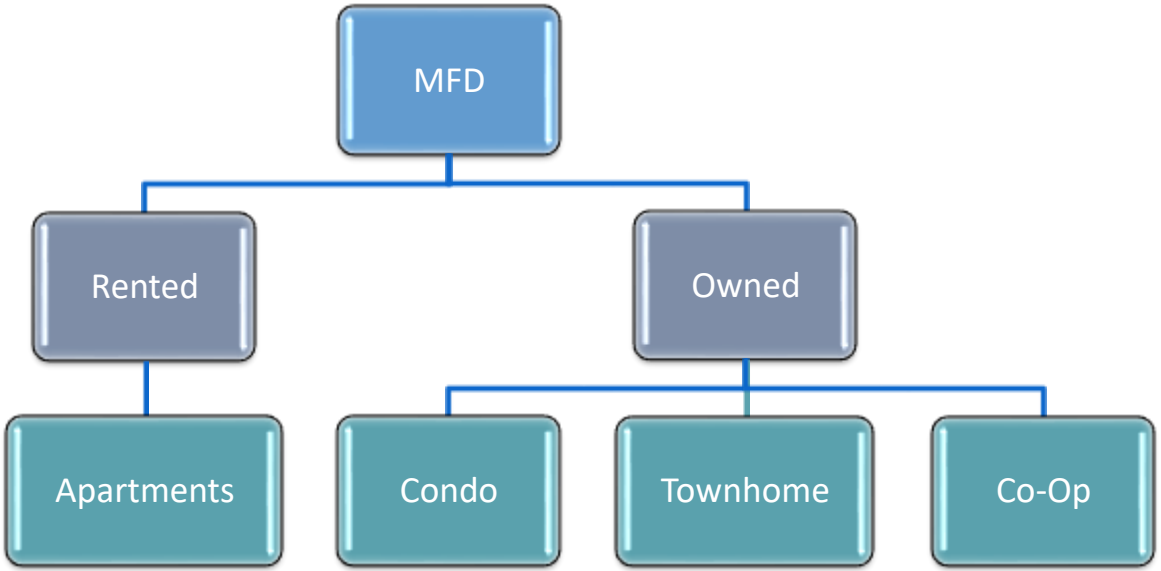
EV Capable vs EV Ready vs. EVSE Installed

- **EV Capable**
  - ***Conduit run*** from available power source to parking space, ending in outlet box
- **EV Ready**
  - EV Capable plus ***circuit breaker, wire and receptacle***, within 3' of EV location
- **EVSE Installed**
  - EV Ready plus ***operating EVSE***

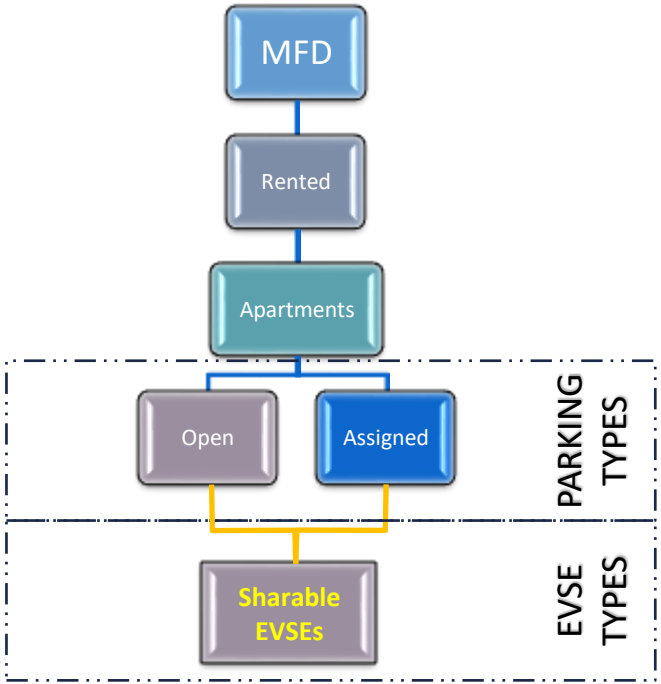


comed℠
AN EXELON COMPANY

MFD Occupancy Types

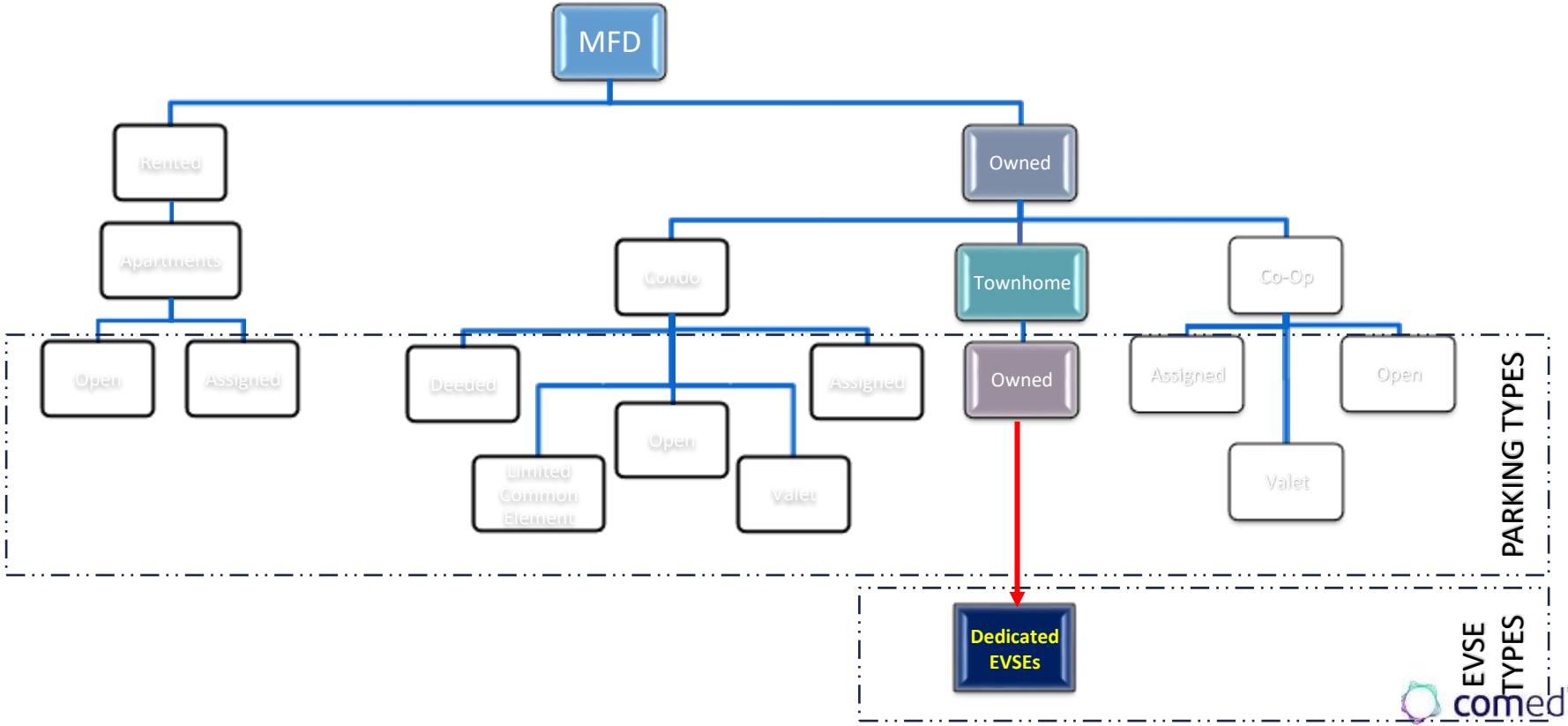


MFD Parking Types: Apartments



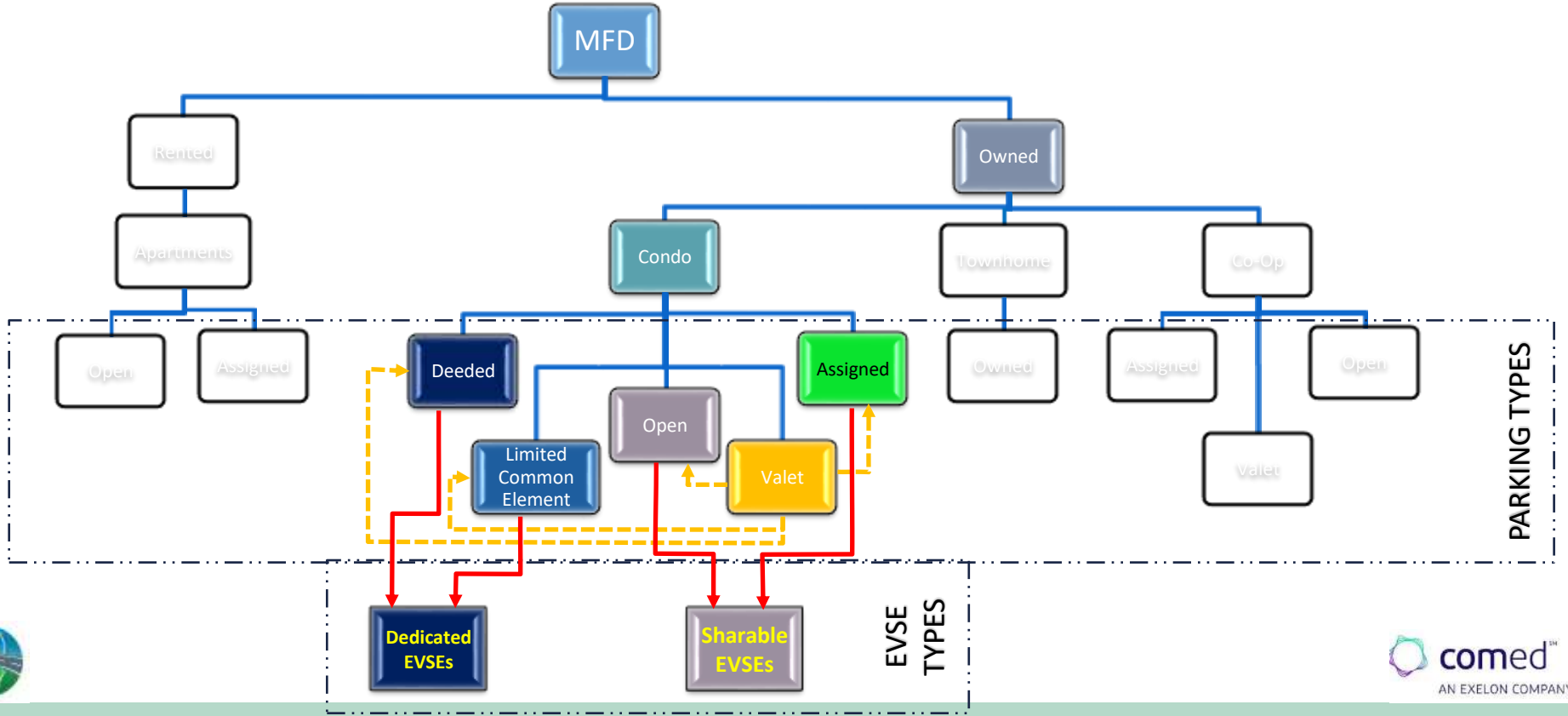
comed™
AN EXELON COMPANY

MFD Parking Types: Townhomes



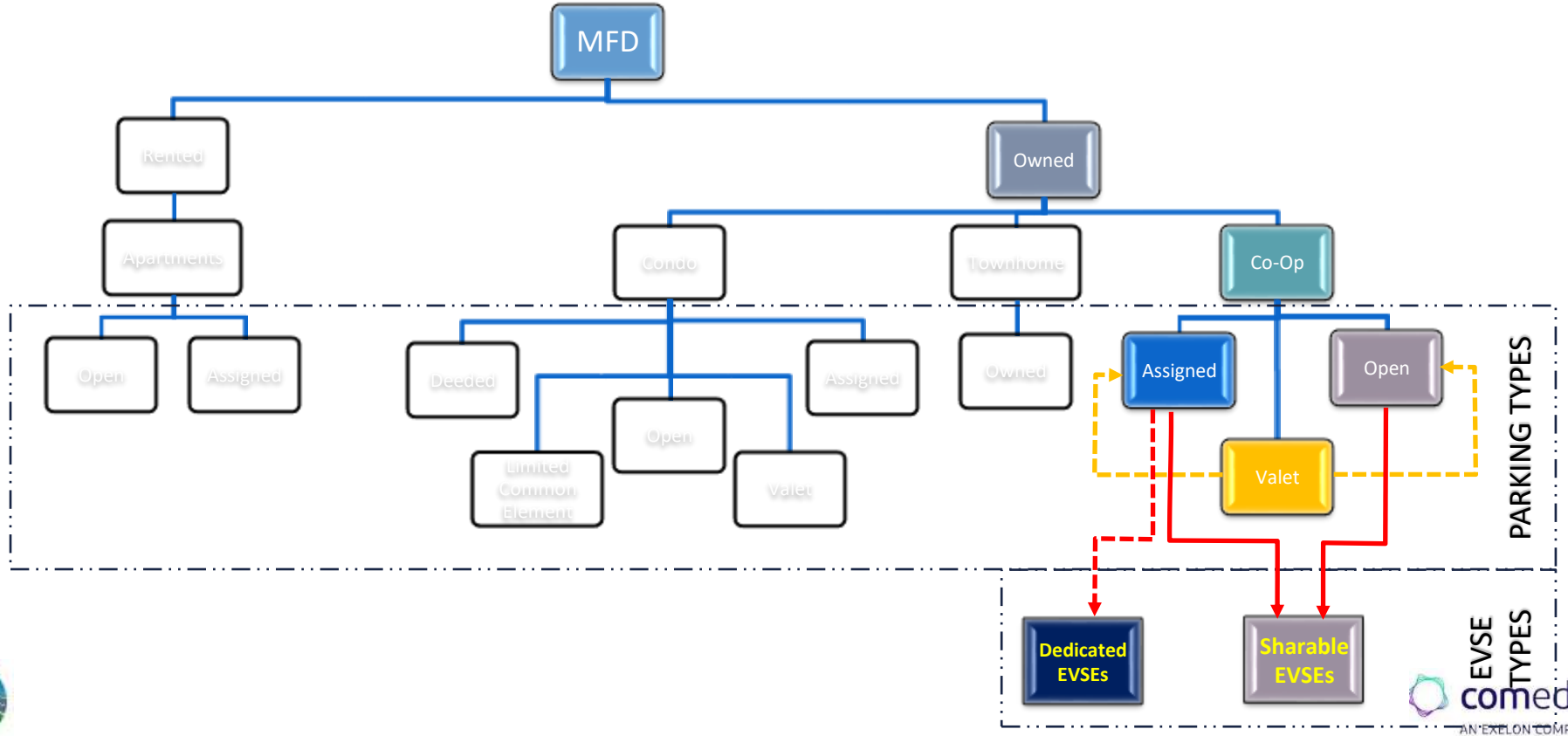
comed™
AN EXELON COMPANY

MFD Parking Types: Condos



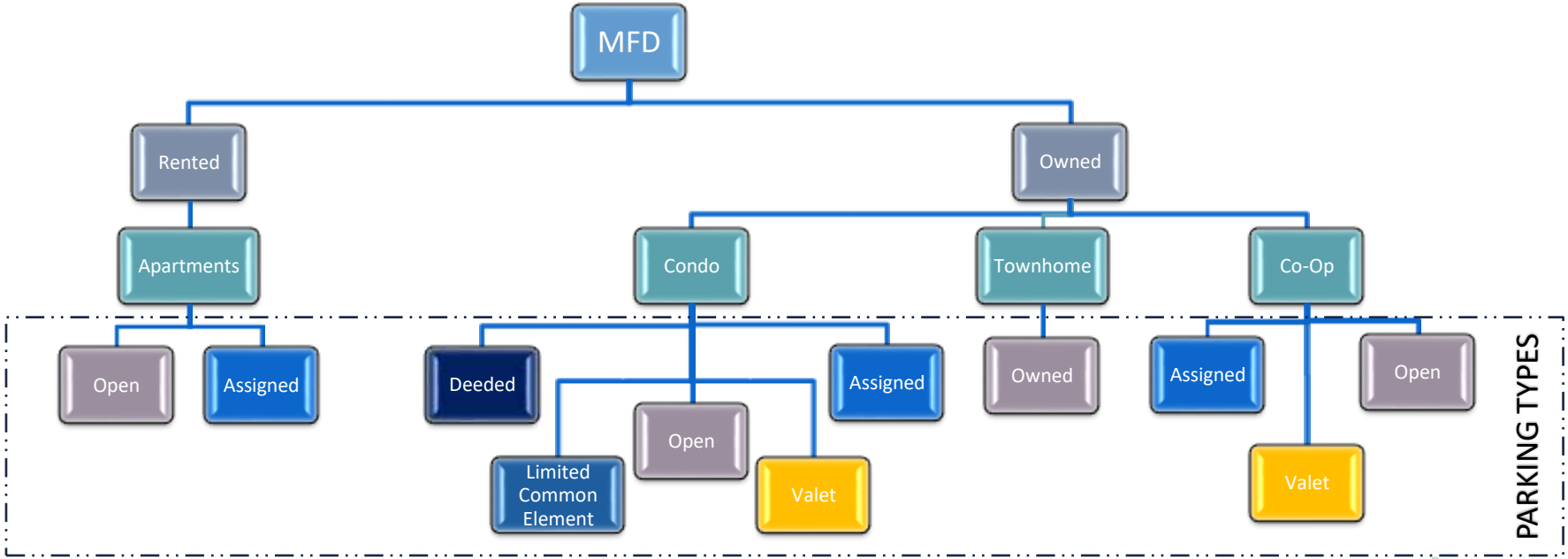
comed™
AN EXELON COMPANY

MFD Parking Types: Co-ops



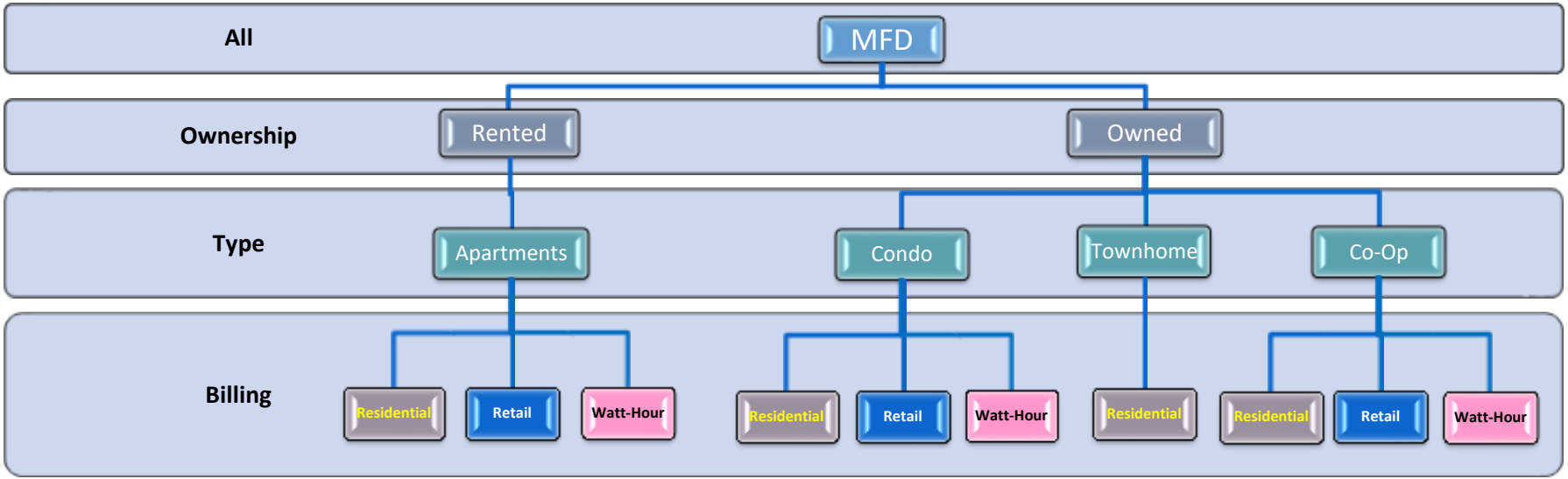
comed™
AN EXELON COMPANY

MFD Parking Types



comed™
AN EXELON COMPANY

MFD Billing Types



comed
AN EXELON COMPANY

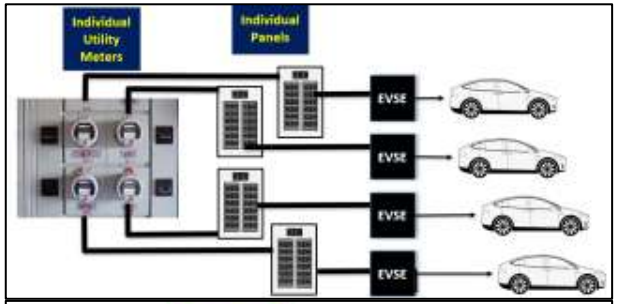
Energy Terms

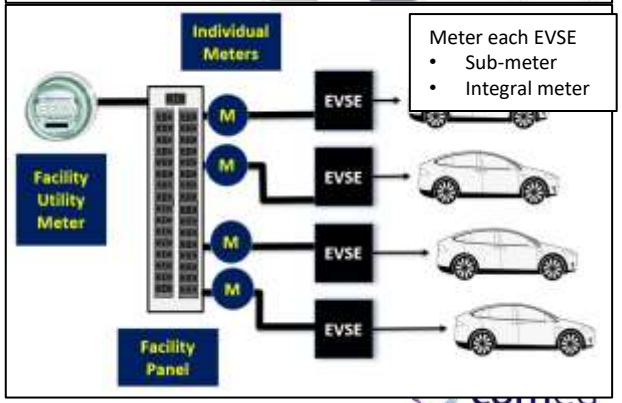
- **Kilowatts (kW)** – measure of power
- **Kilowatt-hours (kWh)** – measure of energy, electricity consumption
- **Power sharing ratio** – Ratio of maximum amperage/ minimum amperage when power sharing

ComEd Billing Options for Single and Multi-Family

- MFD
  - Basic Electrical Service (BES) and Hourly (BESH) – average or hourly pricing, tied to personal utility account.
    - BESH rebates only
  - Common or "House" Power Sourced Rates
    - Rebates apply for either
    - Retail Delivery Service (RDS)
      - Includes monthly peak demand charges
      - Rebates may be available
    - Watt Hour Delivery Service (WHDS)
      - No demand charges
      - Separates power source for EV charging only
        - » Non-EV residents do not share in EV demand charges
      - Rebates may be available

BES, BESH



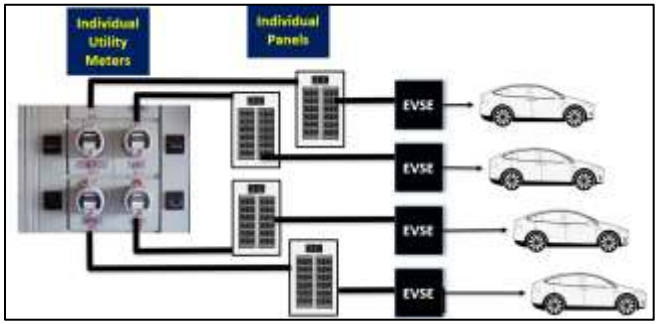


RDS, WHDS

AN EXELON COMPANY

ComEd Billing Options for Single and Multi-Family

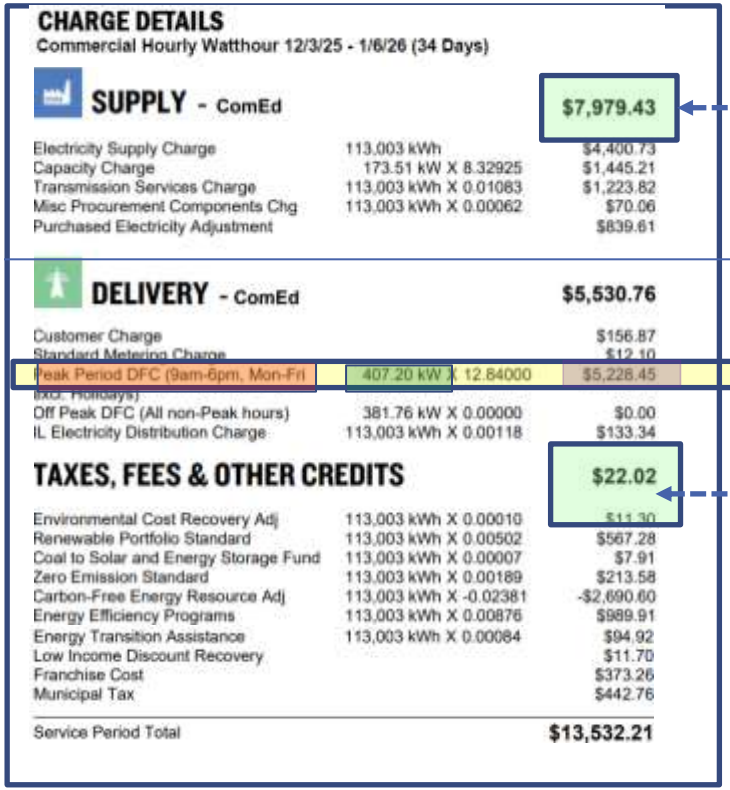
- MFD: Residential Accounts
  - Basic Electrical Service (BES) - average flat rate per kWh
  - Basic Electrical Service Hourly (BESH) – dynamic average hourly pricing



BES and BESH

AN EXELON COMPANY

Retail Rate: bill with kW-based DFC



CHARGE DETAILS
Commercial Hourly Watthour 12/3/25 - 1/6/26 (34 Days)

SUPPLY - ComEd $7,979.43

Electricity Supply Charge	113,003 kWh	$4,400.73
Capacity Charge	173.51 kW X 8.32925	$1,445.21
Transmission Services Charge	113,003 kWh X 0.01083	$1,223.82
Misc Procurement Components Chg	113,003 kWh X 0.00062	$70.06
Purchased Electricity Adjustment		$839.61

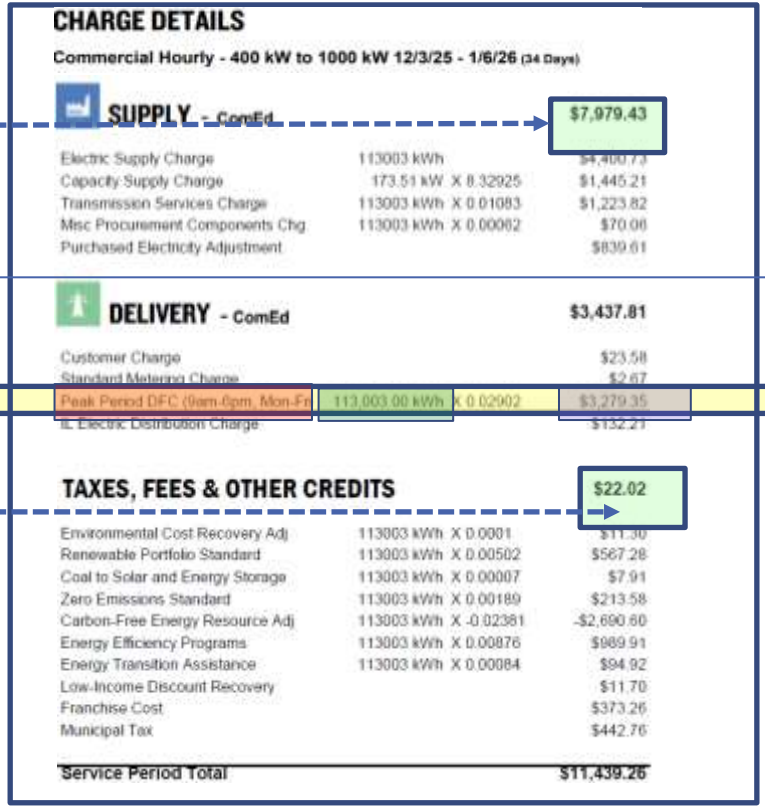
DELIVERY - ComEd $5,530.76

Customer Charge		$156.87
Standard Metering Charge		$12.10
Peak Period DFC (9am-6pm, Mon-Fri excl. Holidays)	407.20 kW X 12.84000	$5,226.45
Off Peak DFC (All non-Peak hours)	381.76 kW X 0.00000	$0.00
IL Electricity Distribution Charge	113,003 kWh X 0.00118	$133.34

TAXES, FEES & OTHER CREDITS $22.02

Environmental Cost Recovery Adj	113,003 kWh X 0.00010	$11.30
Renewable Portfolio Standard	113,003 kWh X 0.00502	$567.28
Coal to Solar and Energy Storage Fund	113,003 kWh X 0.00007	$7.91
Zero Emission Standard	113,003 kWh X 0.00189	$213.58
Carbon-Free Energy Resource Adj	113,003 kWh X -0.02381	-$2,690.60
Energy Efficiency Programs	113,003 kWh X 0.00876	$989.91
Energy Transition Assistance	113,003 kWh X 0.00084	$94.92
Low Income Discount Recovery		$11.70
Franchise Cost		$373.26
Municipal Tax		$442.76
Service Period Total		$13,532.21

Watt-hour Rate - bill with *kWh*-based DFC*



CHARGE DETAILS
Commercial Hourly - 400 kW to 1000 kW 12/3/25 - 1/6/26 (34 Days)

SUPPLY - ComEd $7,979.43

Electric Supply Charge	113003 kWh	$4,400.73
Capacity Supply Charge	173.51 kW X 8.32925	$1,445.21
Transmission Services Charge	113003 kWh X 0.01083	$1,223.82
Misc Procurement Components Chg	113003 kWh X 0.00062	$70.06
Purchased Electricity Adjustment		$839.61

DELIVERY - ComEd $3,437.81

Customer Charge		$23.58
Standard Metering Charge		$2.67
Peak Period DFC (9am-6pm, Mon-Fri	113,003.00 kWh X 0.02902	$3,279.35
IL Electric Distribution Charge		$132.21

TAXES, FEES & OTHER CREDITS $22.02

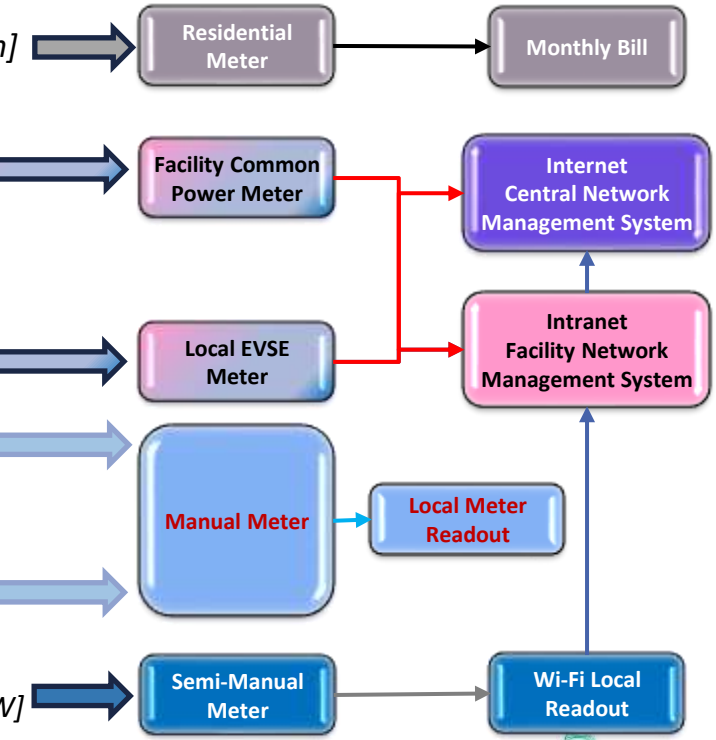
Environmental Cost Recovery Adj	113003 kWh X 0.0001	$11.30
Renewable Portfolio Standard	113003 kWh X 0.00502	$567.28
Coal to Solar and Energy Storage	113003 kWh X 0.00007	$7.91
Zero Emissions Standard	113003 kWh X 0.00189	$213.58
Carbon-Free Energy Resource Adj	113003 kWh X -0.02381	-$2,690.60
Energy Efficiency Programs	113003 kWh X 0.00876	$989.91
Energy Transition Assistance	113003 kWh X 0.00084	$94.92
Low-Income Discount Recovery		$11.70
Franchise Cost		$373.26
Municipal Tax		$442.76
Service Period Total		$11,439.26

*No substantive changes on a customer's bill changes other than Distribution Facilities Charge

comed℠
AN EXELON COMPANY

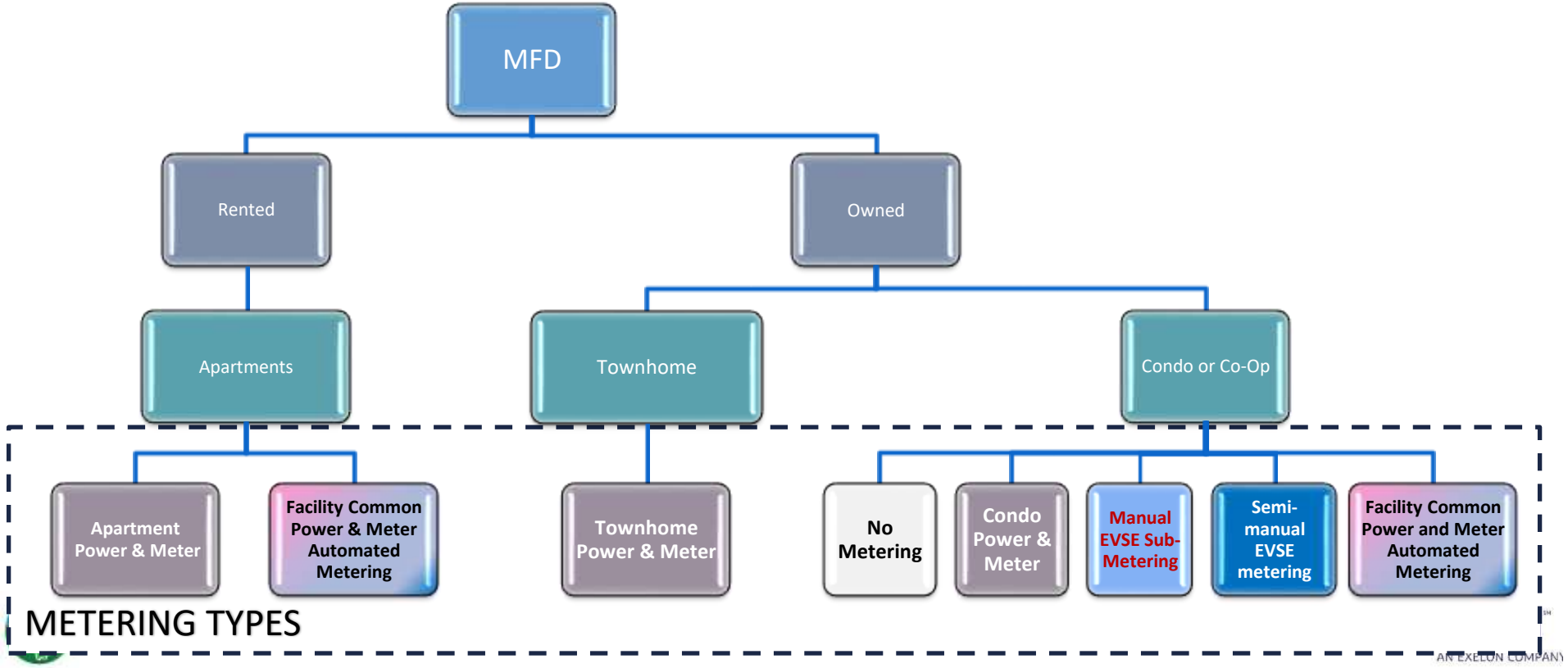
MFD Metering Types

- **Residential** meter – data shows up on monthly bill [*consumption, kWh]*
- **Facility** (utility) meter
  - Measure all uses – charging events and users not separated
  - Retail Delivery: [*consumption, kWh* & *demand, kW]*
  - Watt-hour Delivery [*consumption, kWh]*
- **EVSE** – measure each charging port
  - **Integral sub-meter** [*consumption, kWh* & *demand, kW]*
    - Data available locally and centrally
  - **Input circuit sub-meter** [*consumption*, kWh]
    - Data available locally
- **Panel** sub-meter each output circuit
  - **Output sub-meter** [*consumption, kWh]*
    - Local readout Data available locally
  - **Semi-automatic output sub-meter** – [*consumption, kWh* & *demand, kW]*
    - **D**ata capture and transmission



comed™
AN EXELON COMPANY

MFD Metering Types



EV CONNECTION STANDARDS

Standard Charging Power Levels
EV Supply Equipment (EVSE = EV Charger)

- **AC Level 1**: (120 VAC / 8 to 16 A)
  - Typically plug in /portable
  - **3 to 5 RMPH**
- **AC Level 2**: (208/240/277 VAC, 16 to 80A)
  - Plug in or hardwired
  - **10 to 80 RMPH**

AC in, ***AC*** out

- **DC Fast Charging:** (480+ VAC, 25 to 1000 A)
  - Aka Level 3 Charging
  - **60 to 600 RMPH**

AC in, ***DC*** out

RMPH = Range Miles per Hour added when connected
AC = Alternating Current
DC = Direct Current

comed™
AN EXELON COMPANY

EV / EVSE Standard Connectors: North America

Starting in 2025

MOVING TO ONE STANDARD PLUG AND RECEPTACLE FOR ALL US ELECTRIC VEHICLES AND EVSEs

For Level 1, Level 2 and DCFC (up to 350 kW)

comed™
AN EXELON COMPANY

EV / EVSE Standard Connectors: North America

SAE J1772 *Standard Level 1 & 2 Charging*

SAE Combined Charging System (CCS1) *Standard Level 1 and 2 AC EV and DC Fast Charging US EVs*

Single Standard
SAE J3400 =
North American Charging Standard (NACS)

1000 V Max

Tesla
Tesla: 250 V Max

CHAdeMO *DCFC Standard EV Connection Japanese EVs*

Phasing Out (US)

SAE: Society for Automotive Engineers

comed™
AN EXELON COMPANY

Adapters

NACS → CCS Adapter

EVSE cords and connectors can be swapped out in the future (in Yellow). Not all models.

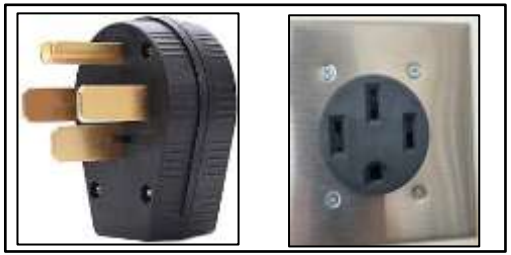
CCS → NACS Adapter

NACS → J1772 Adapter

J1772 → NACS Adapter

comed™
AN EXELON COMPANY

National Equipment Manufactures Association (NEMA) Standard Plugs and Receptacles



Level 2 NEMA 14-50 Standard Plug (14-50-P) and Receptacle (14-50-R)

Level 1 or Level 2: NEMA 14-50P and 5-20P

Level 1: NEMA 5-20R and 5-20R with GFCI

Charger Level	NEMA Plug and Receptacle	Maximum Voltage Rating (VAC)	Continuous Amperes (Amps)	Breaker Size (Amps)
L1	5-15P and 5-15R	120	15	20
L1	5-20P and 5-20R	120	20	25
L2	14-30P and 14-20R	125/250	30	40
L2	14-50P and 14-50R	125/250	48/50	60/75
L2	14-60P and 14-60R	125/250	60	75
L2	7-30P and 7-30P	277	30	40
L2	7-50P and 7-50P	277	48/50	60/75

EVCI must match max Amps

comed™
AN EXELON COMPANY

EV RANGE FACTORS

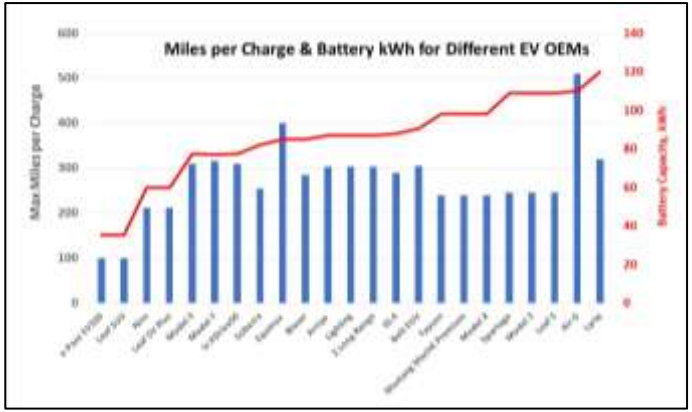
EV Range Factors and Solution Designs

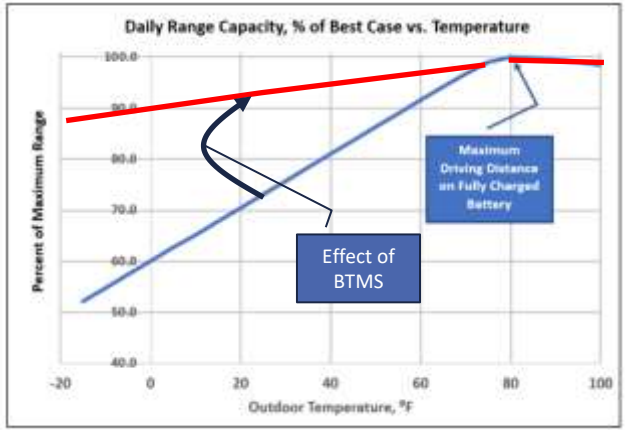
Top concern for all EV Drivers:

Range Anxiety

Range Factors: Battery Factors

1. Battery Factors
    a) Battery capacity (kWh)
    b) Ambient Temperature
    c) Battery Thermal Management Systems

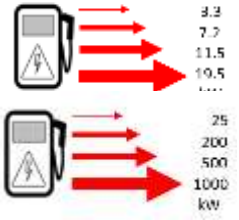




Range Factors: Vehicle Dependent

2. EV Acceptance Rate (kW)

- ***When providing power, an AC or DC Onboard Charging System regulates the rate at which energy that reaches the battery = Acceptance Rate***
- ***Ranges***
  - ***L2: 3.3 kW to 22 kW***
  - ***DCFC: up to 1,000 kW***

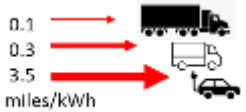


3. EV Efficiency (mi/kWh)

- **Number of miles for each kilowatt hour of energy stored or consumed = EV Energy Efficiency**
- ***→ the new "miles per gallon" metric***

Ranges

- **Passenger EVs: 2.00 to 5.00 mi/kWh**
- **Pickups, shuttles, SUVs: 0.10 to 0.30 mi/kWh**
- **Large trucks/buses: 0.02 to 0.07 mi/kWh**



Factors may influence which EVs and EVSEs you buy

comed™
AN EXELON COMPANY

Acceptance Rate, kW

Level 2

Model (2024)	Acceptance Rate, kW
AC Charging (L2)	
Chevy Volt (2017)	3.8
Nissan Leaf SV (2023)	7.7
Subaru Solterra (2024)	7.7
Chevy Bolt (2024)	7.7
Nissan Ariya (2024)	7.7
Chevy Blazer EV (2024)	11.5
Ford Mustang Mach-E (2024)	11.5
Hyundai Ioniq 5 (2024)	11.5
Hyundai Ioniq 6, LR (2024)	11.5
Tesla Models Y (2024)	11.5
Tesla Models X (2024)	11.5
Tesla Models 3 Long Range (2024)	11.5
VW ID.4 Pro (2024)	11.5

Most Common 2026

DCFC

Model (2024)	Acceptance Rate, kW
DC Charging	
Chevy Bolt PEV	55
Nissan Leaf e+	125
Nissan Ariya e-4ORCE	130
VW ID 4	125
Ford Mustang Mach-E	150
Audi –e-tron 15	150
High Powered DCFC	
Rivian R1T	220
Hyundai IONIQ Long Range 2WD	220
Kia EV6 GT	233
Tesla Model 3	250
Porsche Taycan 4S Plus	350
Tesla Model Y Performance	350
Tesla Model S Plaid	350
Tesla Model S Long Range	350
Lucid Air Grand Touring	350

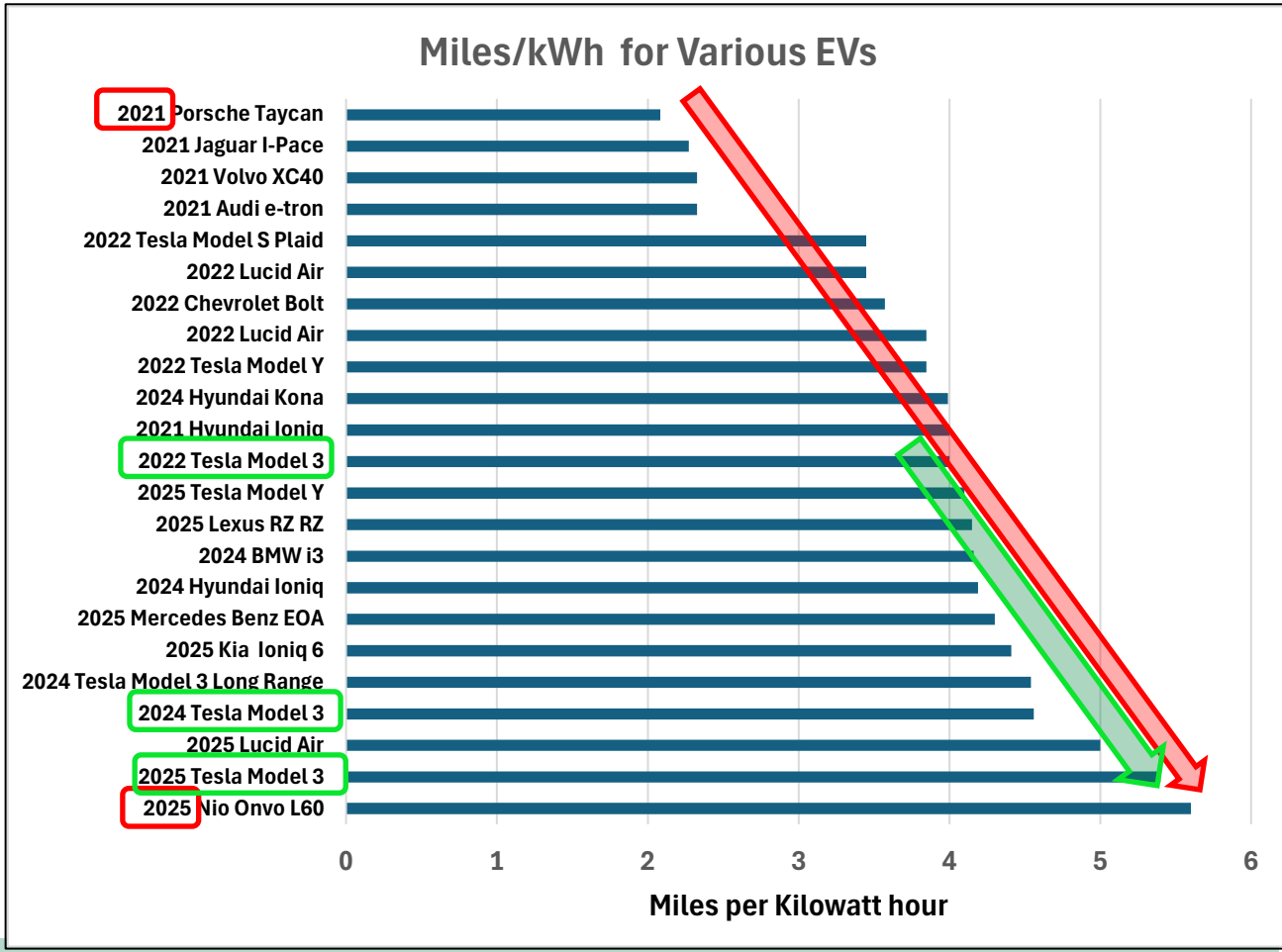
Coming

comed™
AN EXELON COMPANY

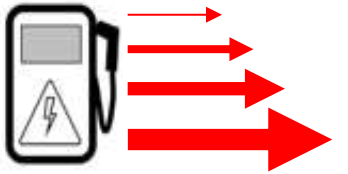
EV Efficiency

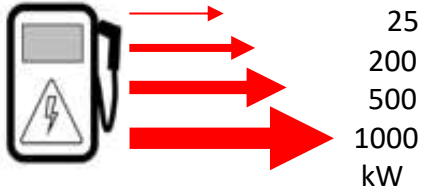
- How far can you go on one kilowatt hour?
- Depends on EV

- *All EVs at ambient temp ~70F*



EVSE Power Delivery Rate





Level 2 Standard Sizes (Level 2)

- kW range from 3.3 to 22
- Volts: 208/240/277
- Amps: 16 to 80

DCFCs

- kW range from 25 to 1,400
- Voltage from 480 to 1,000
- Amps vary depending on supply voltage

- Data from EPRI Vetted EVSE Product list

Most Common 2026

Level 2 (240 V)

Brand	Max Power (kW)	Max Amperage
ABB	19.2	80
ABB	9.6	40
Autel	19.2	80
Autel	12	50
Autel	8.3	35
Blink	12	50
Blink	7.2	30
Blink	7.2	30
Blink	11.52	48
Blink	9.6	40
Blink	11.52	48
Blink	19.2	80
Blink	19.2	80
Blink	8.3	35
ChargePoint	9.6	40
ChargePoint	12	50

DCFC

Name	Max Power (kW)	Max Amperage
ABB	24	29
BTCPower	25	30
Blink	30	36
Zerova	30	36
Autel	40	48
FLO	50	60
ChargeTronix	60	72
ChargePoint	62.5	75
Enel X Way	75	90
Autel	80	96
ChargePoint	80	96
ABB	90	108
XCharge	95	114
Autel	100	120
Delta	100	120
Autel	120	145
Blink	120	145
BorgWarner	125	151
Autel	140	169
ABB	150	181

SUPPLY AND DEMAND

Supply and Demand Planning

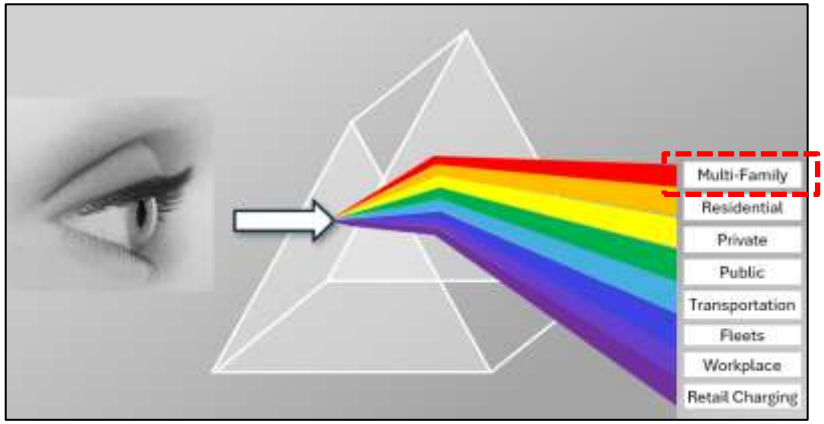
- Main planning questions:
  - **Which residents are interested in EV charging now and in the future**
  - **To recharge EVs, *how much electrical power* is needed to support?**

New Construction
Demand Profile
Defined by local, state ***codes***
Parking space count
Minimum recharge rate and amps
Maximum recharge rate and amps
Translate into power demand (kW)
Consider future proofing/ redundancy
Supply Profile
Quantify design power based on demand
Define investments
Evaluate benefits of power sharing
Size and select equipment solutions

Retrofit Construction
Demand Profile
Defined by ***usage profile***
EV count, daily miles, time of day
Minimum recharge rate and amps
Maximum recharge rate and amps
Translate into power demand (kW)
Consider future proofing/ redundancy
Supply Profile
Quantify design power based on demand
Quantify the amount of ***available*** power
Determine if demand can be met with available capacity
If so, what investments? When?
If not, ***new power*** amount needed? What investments? When?
Evaluate benefits of power sharing
Consider staging solutions
Size and select equipment solutions

Power Supply ≥ Power Demand

comed™
AN EXELON COMPANY



DEMAND PROFILES

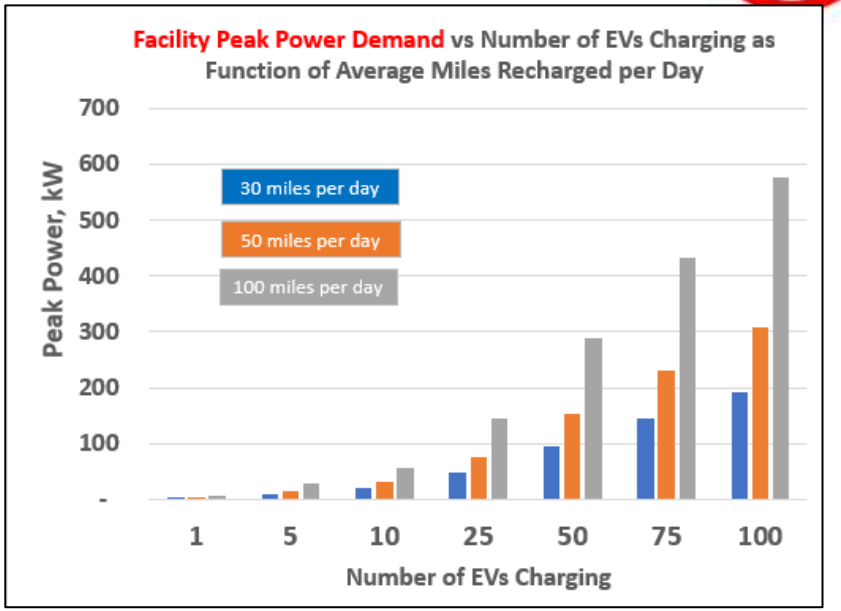
EV Charging Decision Steps

Demand Side Profile

1. Determine **Power Usage Profile =** dynamic **power demand**
   - Use case
   - Use surveys, assessments
2. Identify **acceptance rates** of EVs using EVSEs
3. Consider **value of EV charging for** the property – some MFDs are advertising “EV Ready”
4. **Communicate** with residents
5. Determine whether EV charging will be **dedicated and/or shared**

Use Case Decision Factors

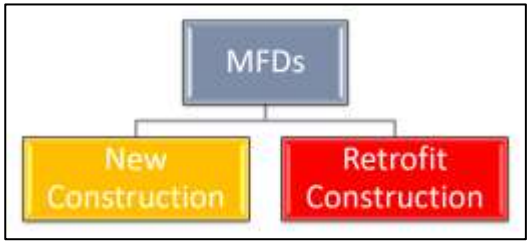
- **Operational Profile**
  - Types and quantities of EVs
    - Number of EVs now and over time
    - How many miles each day to recharge?
    - When will EVs be charged? For how long?
    - Hours of operation
    - Seasonal adjustments
  - Rate of recharge
    - Ambient Temperature impacts
    - Acceptance Rate
    - Energy Efficiency rates
  - Reliability - equipment and vehicles
  - Cumulative power maxima
  - Leveraging power sharing
  - Utility rates: consumption and peak demand
  - Safety

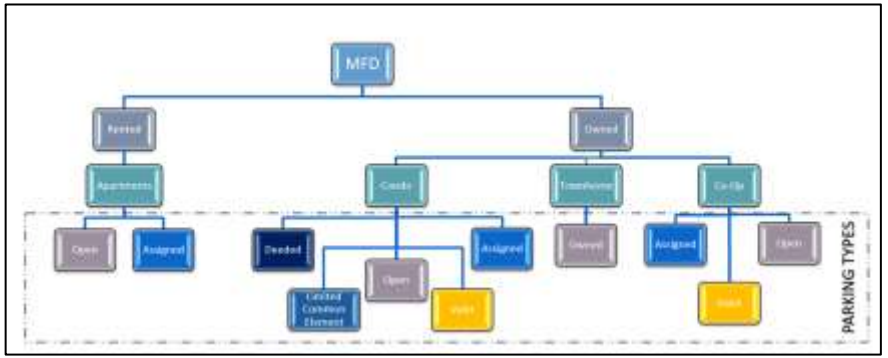


comed
AN EXELON COMPANY

Facility Decision Factors

- **Facility**
  - Construction Type (new / retrofit)
  - Parking Type
    - Occupancy type: rental, own, condo, townhome, co-op
    - Deeded vs. assigned vs. open parking spaces
    - Space ownership
    - Public vs private access
  - Type of structure, parking lot or parking garage
    - Indoor vs. outdoor (heated garage vs. open lot)
    - Penetrations
    - Trenching and boring
    - Structural evaluation
  - Applicable codes
    - MFD, residential, commercial
    - New vs retrofit construction
    - Stretch Codes





comed
AN EXELON COMPANY

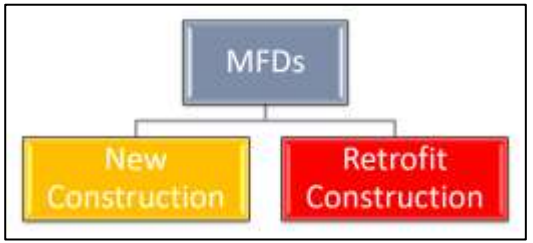
Demand based on Construction Type

Quantifying Demand

Design Power = Number of electrified spaces x Maximum design charging power / Maximum Power Sharing Ratio

- Maximum power, **New Construction**
  - Demand basis: ***compliance*** with National, State and Local Codes

- Maximum power, **Retrofit Construction**
  - Demand basis: ***facility and residents' goals***



comed™
AN EXELON COMPANY

***EV Charging Processes*: Other Decision Factors**

- **Access Management**
  - Who can use
  - What technology allows access
  - Set up process
- **Process options**
  - Valet
  - Reservation
  - Wait listing
  - Idling fees
- **Communication**
  - Networking, payment systems, ties to grid, reporting
- **Metering**
  - Local vs. centralized
- **Billing**
  - Price management
  - Tiered Pricing
  - Idle fees
  - Billing Management
- **Energy Management**
  - Power sharing, distributed energy, Vehicle to Grid, demand response management, Plug and Charge
- **Accessibility** requirements
- **Reporting** and other value-added capabilities

Value Added Capabilities

ENERGY MANAGEMENT SYSTEMS

EVCI Max Design Current /Power

Maximum current (Amps) / power (kW)

- Constrains
  - Amount of power available from utility
  - Amount of power available at each power node in each facility
  - Amount of power allowable in breaker/ breaker size
  - EVSE maximum power delivery rating

- Defines sizes of conduits and wiring feeding EVSEs

$$Power = Current\ x\ Voltage$$
$$P = I\ x\ V$$

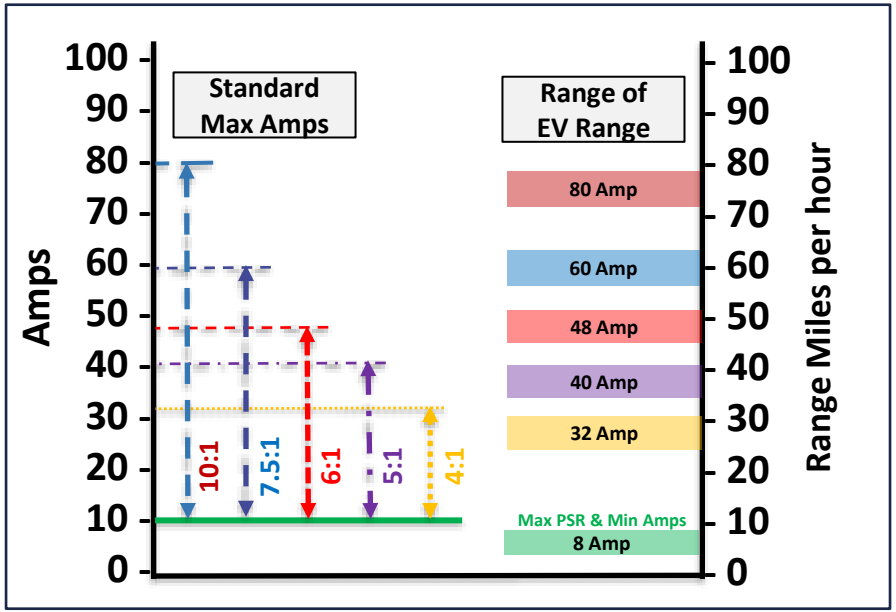
comed℠
AN EXELON COMPANY

EV Energy Management Systems (EVEMS)

- Energy management systems (EMS) regulate what current flows where, when and for how long.
- Commonly called “load sharing” or “power sharing”
- For EV charging: EVEMS manages current going to EV connections / ports
- Range miles of recharge is proportional to current (Amperage, Amps)
- More sharing, slower recharge rate
- Sharing scheme tied to use case
- Types
  - Static power sharing – time constant power
  - Dynamic power sharing- time variant power
  - Facility power sharing – share amps with other energy uses in a building
  - Panel power sharing – share amps within a panel
  - Circuit power sharing – share amps within a circuit
  - Hours of operation
  - Deman response
  - Combinations

Standard Design Amperage Maxima vs Reange Miles Per Hour and Maximum Power Sharing Ratios

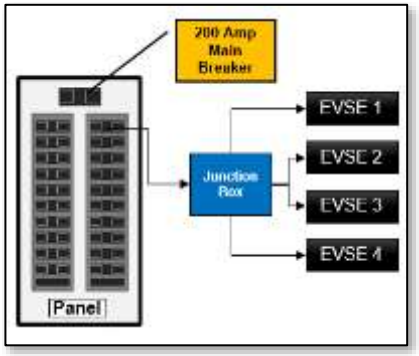
- 5 Standard Amperage Levels
- 8 Amp Minimum when power sharing
- Range of recharge miles depends on EV



comed
AN EXELON COMPANY

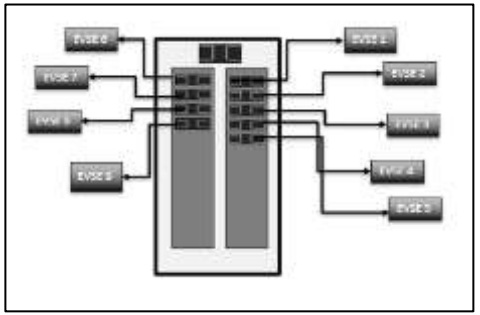
EV Energy Management Systems (EVEMS)

- Increasingly common in MFDs for EV charging
  - Allows more EVSEs to be installed for less
  - Extends facility capacity to serve more EV charging spaces before needing utility service upgrade
  - Optimizes initial investments while providing scalability and expandability
  - Decreases recharge range proportionately

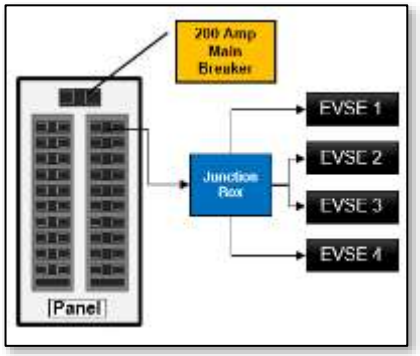


Power Distribution with Energy Management

- **No power sharing**
  - 200 A panel:
    - 9 circuits @ 32 Amps



- Share power in a **circuit**

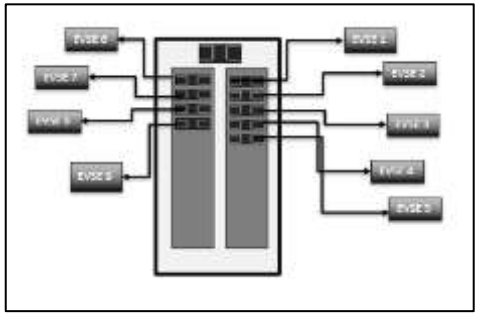


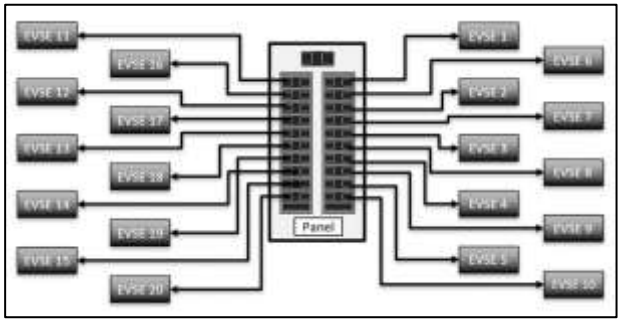
→ EVSEs control power to not exceed ***circuit*** loads
→ Lowest cost EVCI investments
→ Good solution if EVSEs are grouped or if large % of spaces have charging

comed™
AN EXELON COMPANY

Power Distribution with Energy Management

- **No power sharing**
  - 200 A panel:
    - 9 circuits @ 32 Amps





- Share power in a **panel**
  - 20 Circuits in standard panel
  - 2 to 3X the circuits

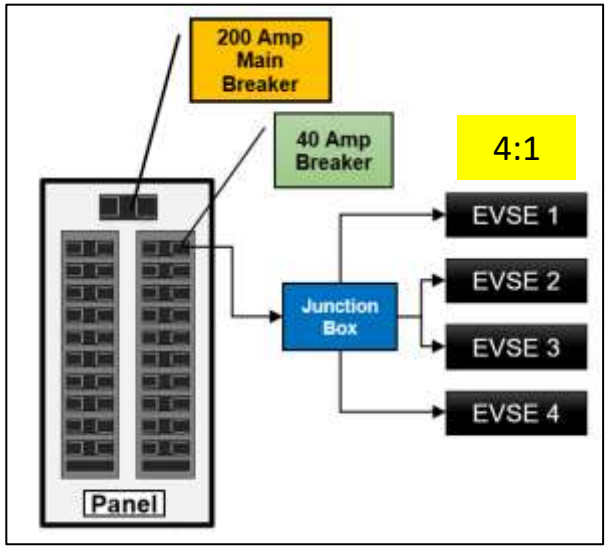
→ EVSEs control power to not exceed panel or breaker loads

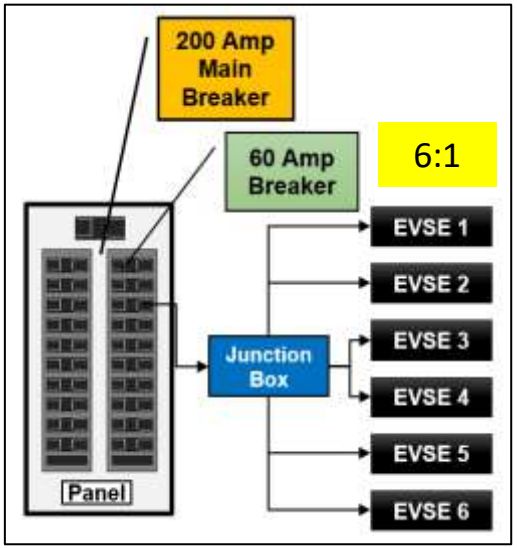
→ Reduces EVCI investments

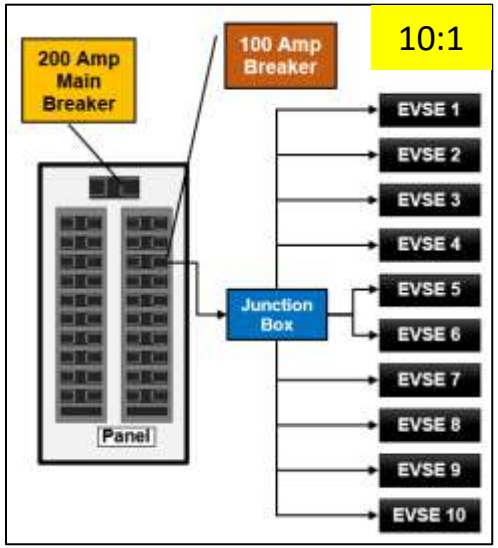
→ Good solution if EVSEs are few or randomly located

comed™
AN EXELON COMPANY

Circuit Power Sharing: Breaker Sizes







Continuous load circuits:

32 Amp *48 Amp* *80 Amp*

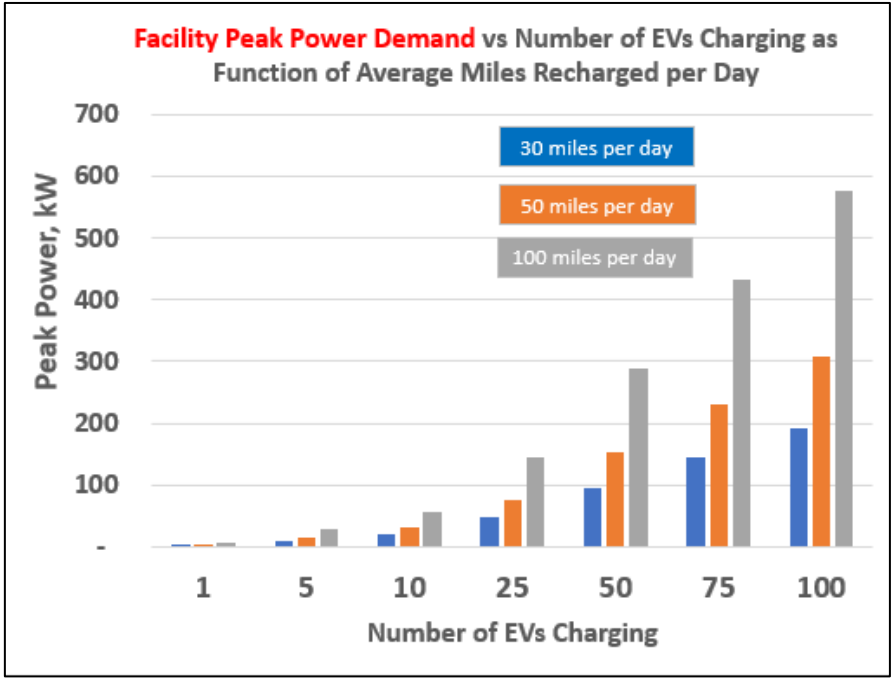
Breaker sizes:

40 Amp *60 Amp* *100 Amp*

Standard 42 slot panels

Use Case Determines Power Needs

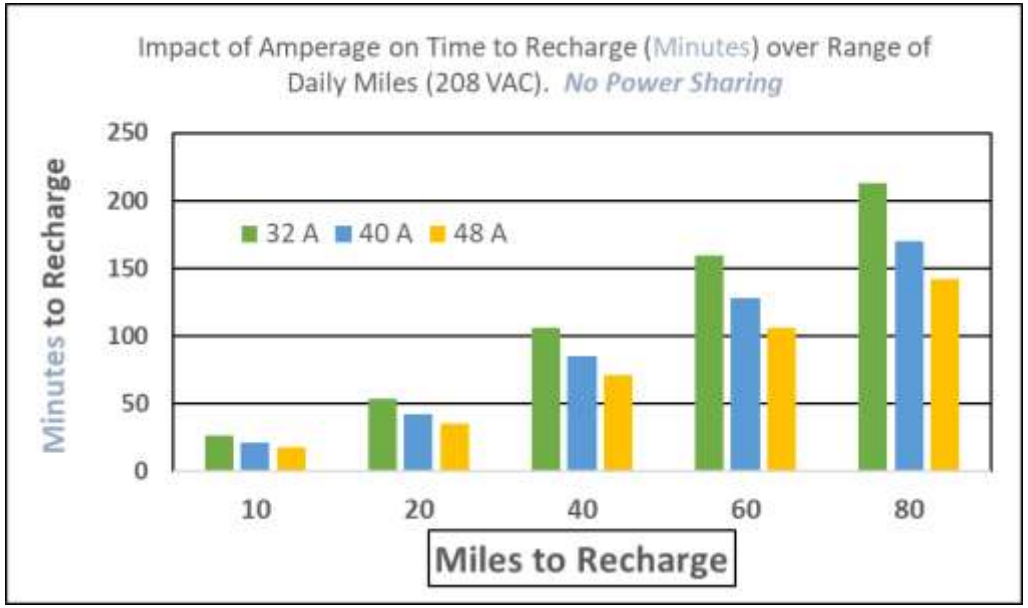
- More EV miles→ more power
- Depends on average miles per charging event



comed
AN EXELON COMPANY

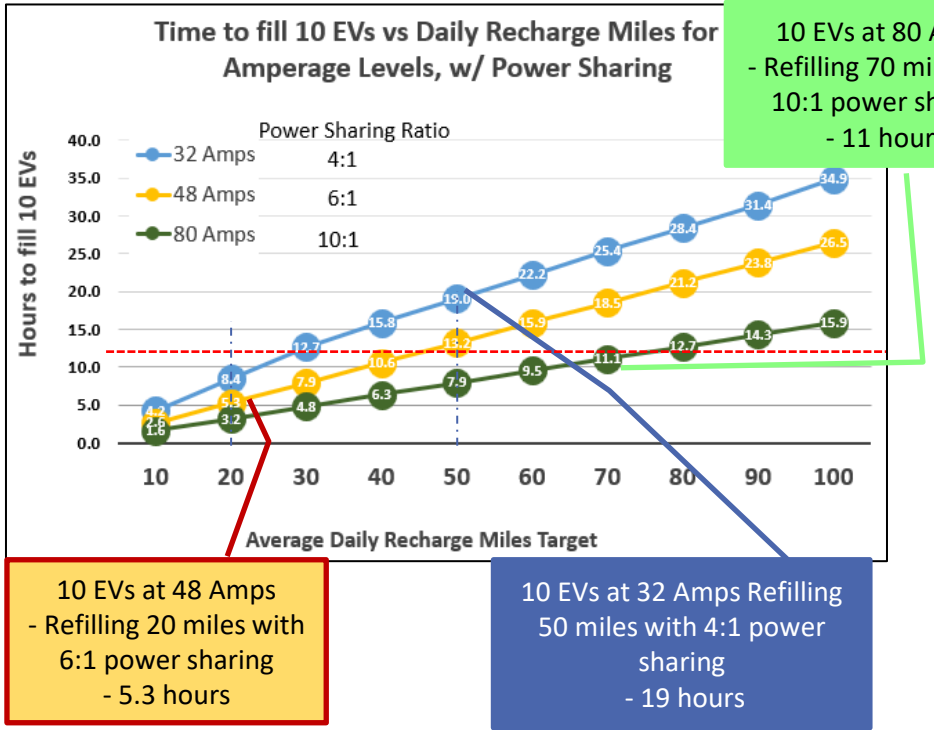
Use Case Determines Dwell Time

- More miles→ More time
- More charging Amps→ Faster charging



Effect of Power Sharing

- 10 EVs sharing facility power
- Vary amperage
  - More design amps
    - More expensive
    - More simultaneous charging
    - Few EVs with 80-amp capacity
  - More amps: less time
  - More miles: more time
- *Balance use case (hr./day) with costs and acceptance rates (A) → design amps*



comed™
AN EXELON COMPANY

Thank You

Tim Milburn

GREEN WAYS 2GO

Tim.Milburn@greenways2go.com

847-826-3314

www.greenways2go.com

comed™
AN EXELON COMPANY

Welcome Sid Bennett

Multiple Family Dwelling
Case Study

IACT
ILLINOIS ALLIANCE FOR CLEAN TRANSPORTATION

comed℠
AN EXELON COMPANY

January 29, 2026

Ready, Set Charge!

Decision Making for EV Charging in Multiple Family Dwellings:

Investments and Cost Recovery

IACT
ILLINOIS ALLIANCE FOR CLEAN TRANSPORTATION

comed℠
AN EXELON COMPANY

TIM MILBURN

GREEN WAYS 2GO

January 29, 2026

Planning

SUPPLY SIDE INVESTMENTS

Supply Side Decision Steps

Supply Side Profile

1. Determine **charging level(s)** (L1, L2, DCFC)
2. Determine building **existing power capacity supply** and any need to increase (utility bill analysis or contact utility)
   - Engage utility early in process to confirm capacity
3. Quantify **increase in demand short- and long-term**
   - Provides input as to when/ demand profile may be expanded
4. Identify EVSE **location(s)**
5. Determine **parking area modifications** (trenching, striping, signage, bollards, ADA compliance)

comed 50
AN EXELON COMPANY

Scope Decision Factors

- **Capital Investments**
  - Who pays for what?
  - How is financing structured?
  - Investment sequencing
  - Future proofing
  - Budgets
  - Incentives – availability, eligibility and timing
  - Existing power vs expansion
  - Use of energy management (power sharing)
  - Need to engage utility
- **Operating Costs**
  - Electricity
    - Consumption
    - Demand Charges
  - Subscription fees
  - Extended warranties
  - Maintenance

Energy Management

- Power sharing, distributed energy, Vehicle to grid, demand response management

Communication / Networking needs

- Network or not?
- Identify networking benefits and costs
- For networked solutions, assess signal strength and needs for signal boosting

Determine Solutions

- As required, consider 3rd party Site Evaluations to assess facility electricity supply and investment scenarios

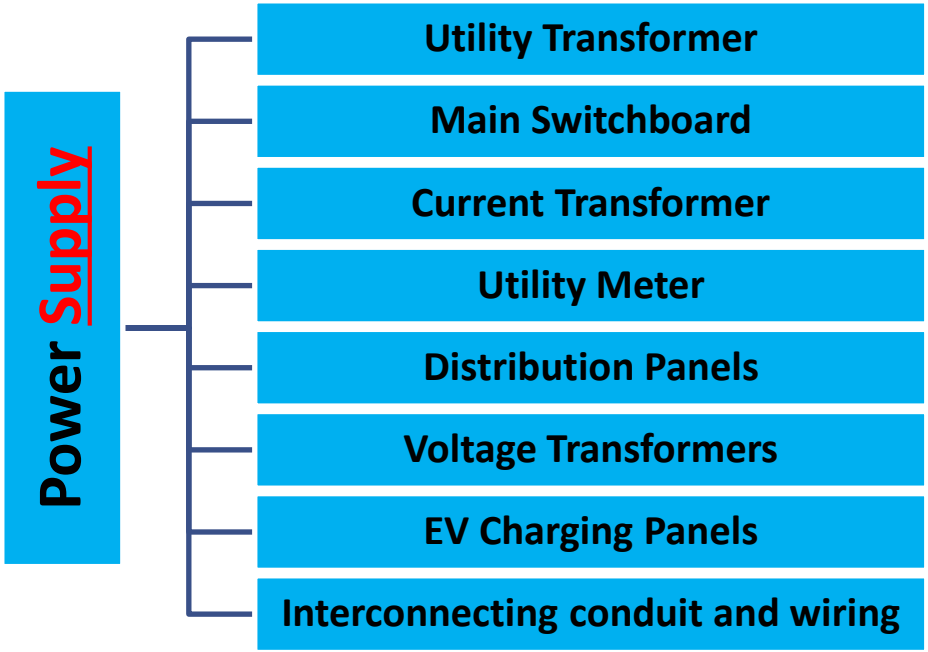
EV Charging Infrastructure

EVCI

Power Supply

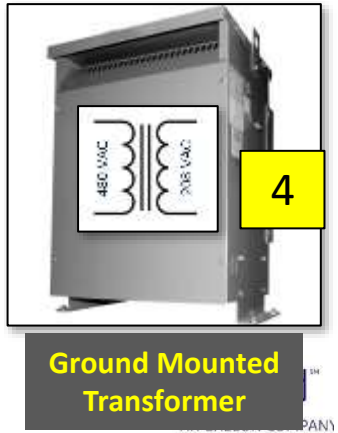
Power Distribution

Power Supply Equipment



Power Supply Equipment

1. **Switchboard** – point where utility power enters facility. Includes electrical disconnects, switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchboards feed:
   2. **Distribution panels** – supplied from switchboards, feed downstream EV charging panels
   3. **Transformers** – a device that converts higher voltage to lower voltage (Typically 480 V to 208 or 240 V).
   4. **EV charger panels** supplied from switchgear or distribution panels

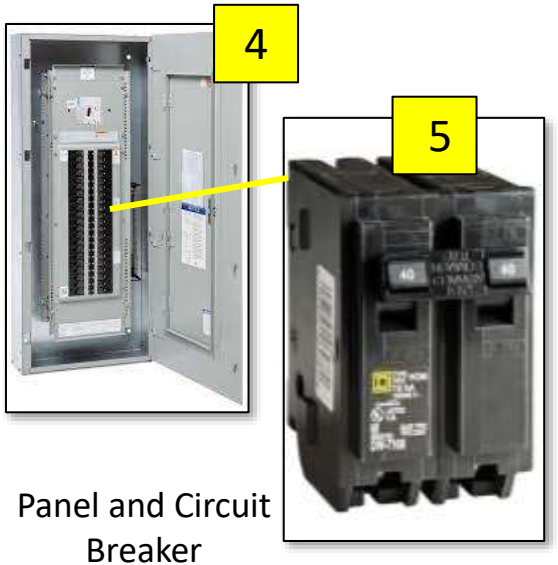


Power Supply Equipment

4. **EV Charger panels = electrical panels**
   = circuit breaker panels
   - Electrical load – amount of amperage or kilowatts used when EV is charging – applies to circuits, panels, switches

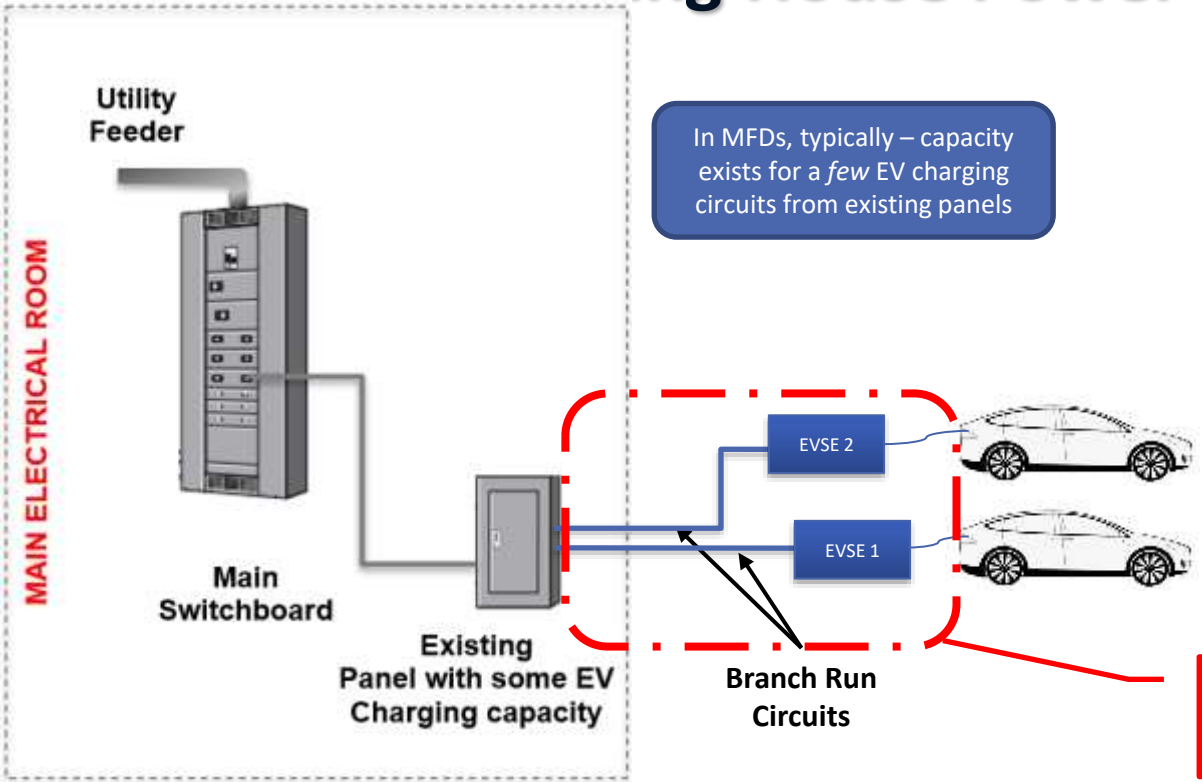
5. **Circuit breaker – safety device set to trip at 125% of load**

Example: 48 Amp load x 125% = 60 Amp breaker



Panel and Circuit Breaker

Power Supply: Branch Runs Using Existing House Power

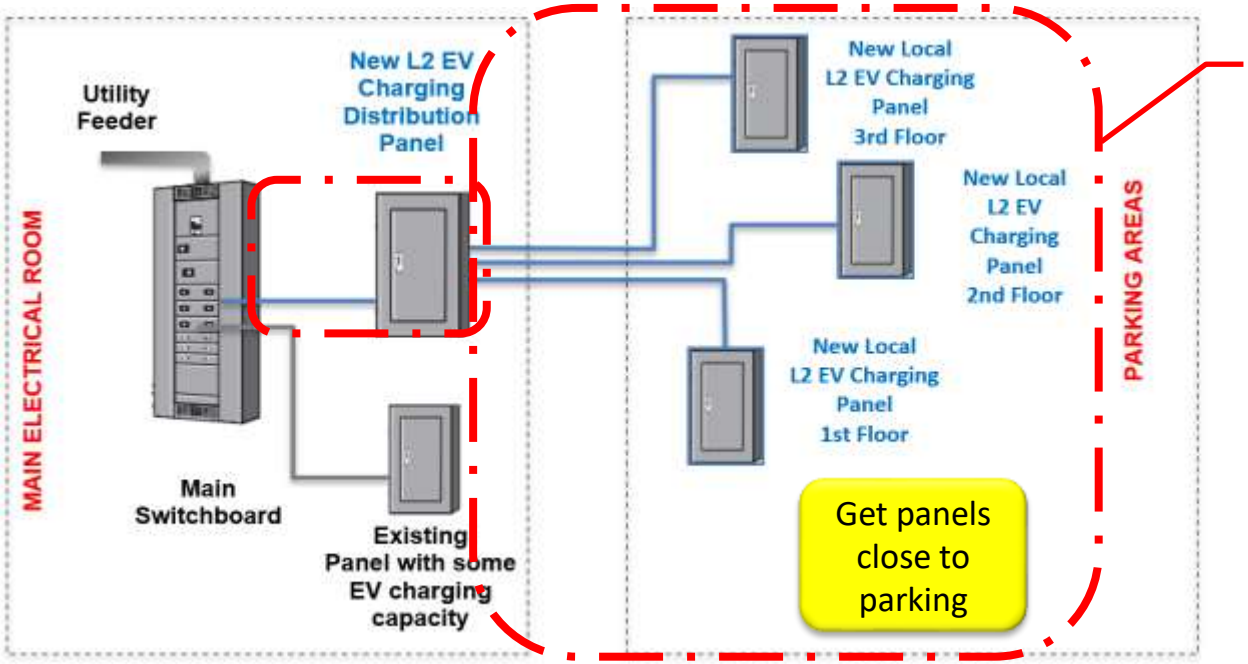


In MFDs, typically – capacity exists for a *few* EV charging circuits from existing panels

Typ. $1,500 to $12,000 each
Distance is key variable

comed
AN EXELON COMPANY

Power Supply: Adding Panels

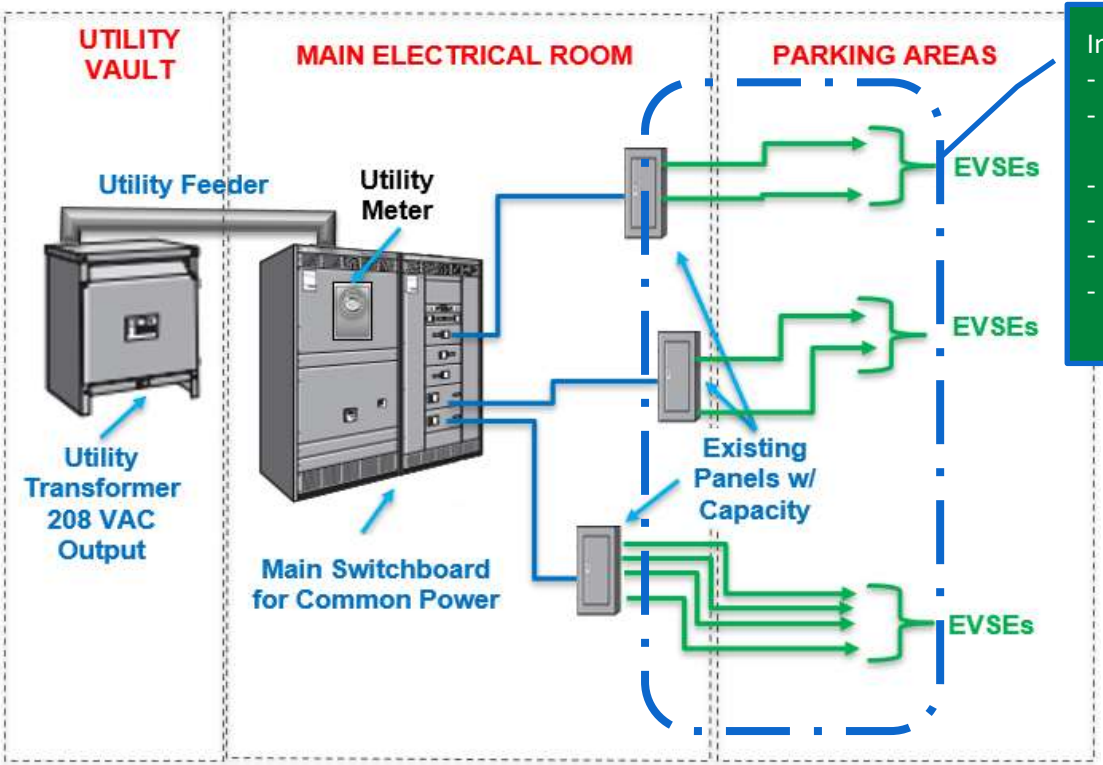


Investment variables
- Use of power sharing?
- Distances
- Number of panels
- EV charging maximum amperage
- Future Proofing?

Adding Field Panels

comed™
AN EXELON COMPANY

Power Distribution Equipment

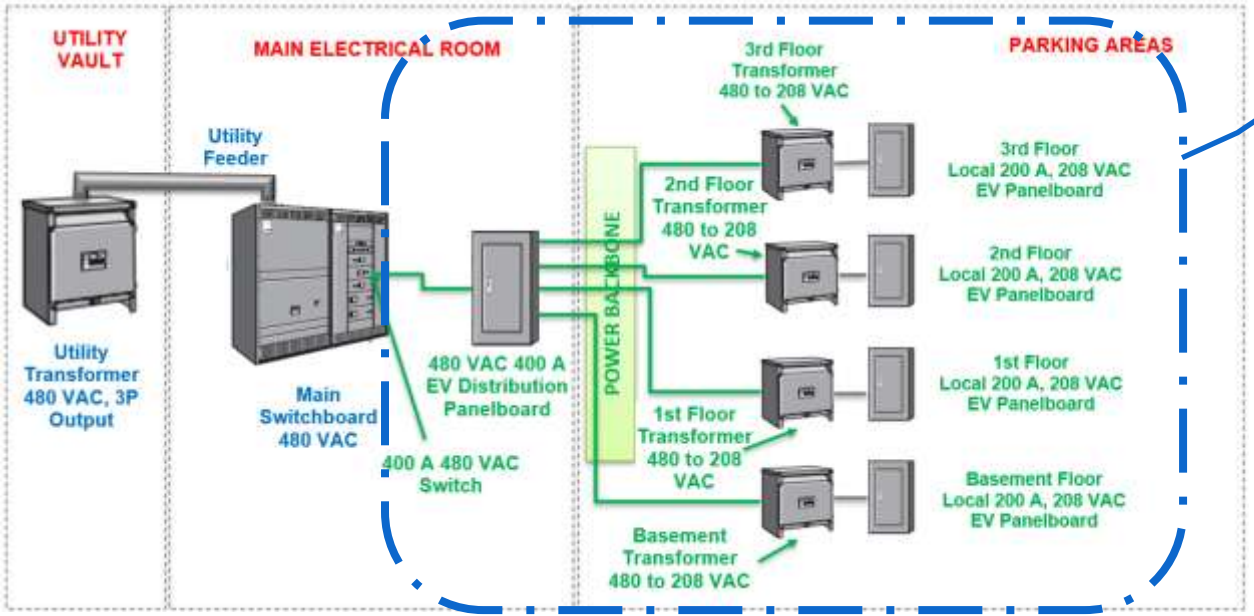


Investment variables
- Use of power sharing
- Full EV Ready vs. EV Capable vs. partial EV Capable
- Future Proofing?
- Distances
- Number of panels
- EV charging maximum amperage

Power Distribution from Central Power

comed™ AN EXELON COMPANY

Sizing and Selecting Power Supply Equipment

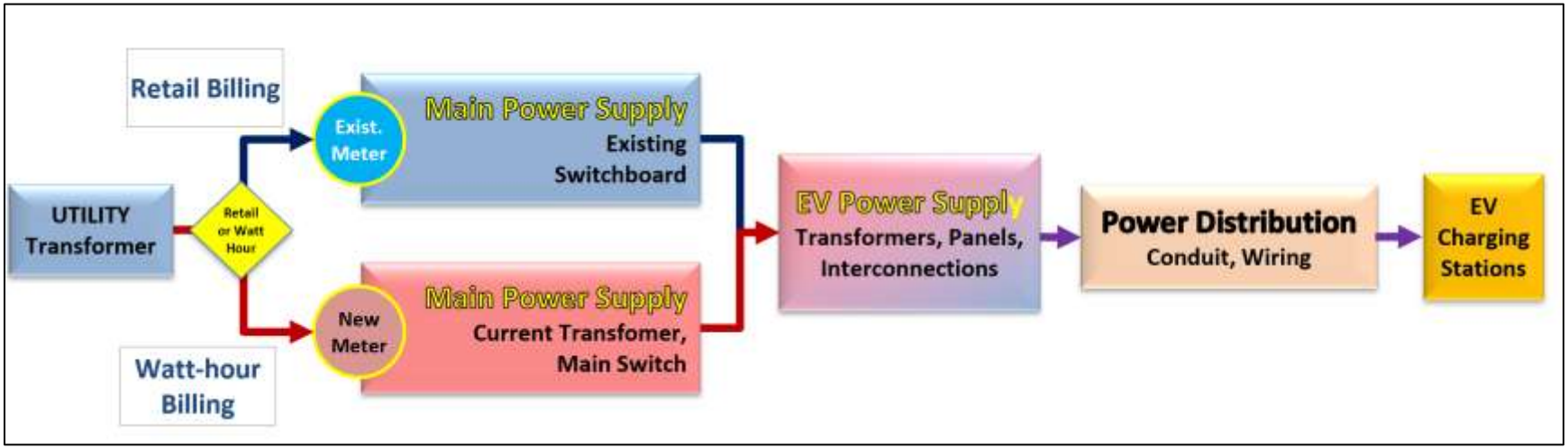


Investment variables
- Distances
- EV charging maximum amperage
- Use of power sharing
- Amount of future proofing
- Number of EV charging panels
- Number of transformers

De-centralized Voltage Transformation & Add Panels

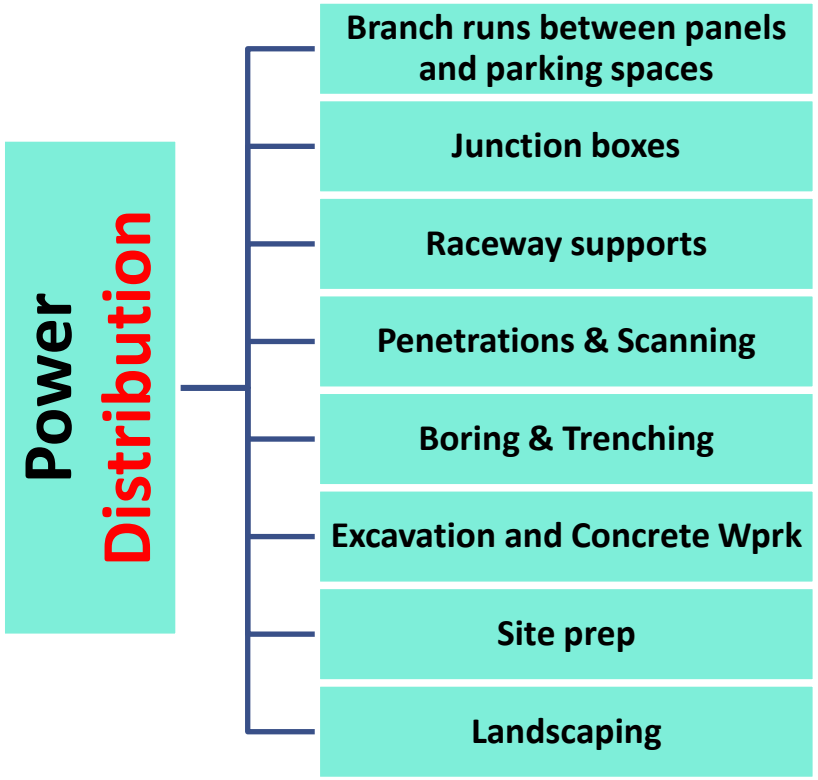
comed™
AN EXELON COMPANY

EVCI and Billing Type



comed
AN EXELON COMPANY

Power Distribution Equipment

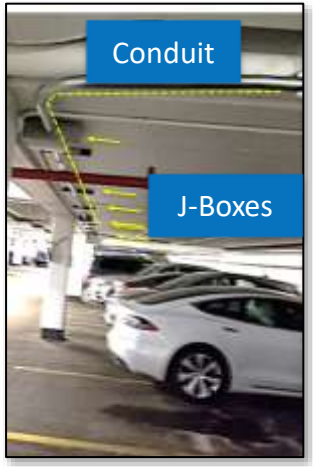


Power Distribution

Branch Runs and Conduit Distribution Networks

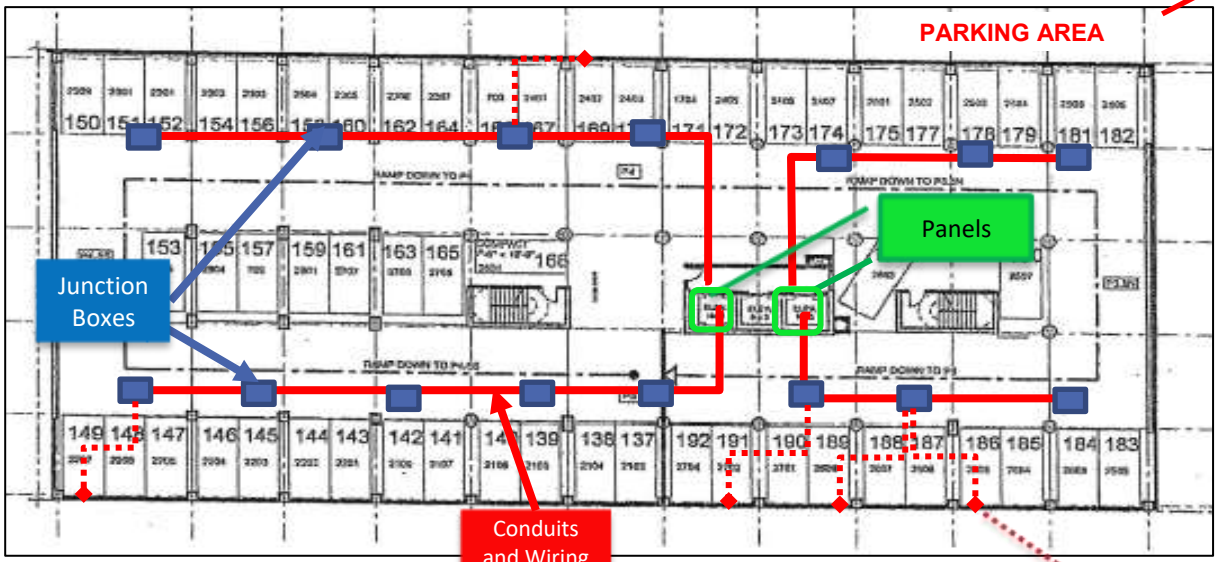
6. Branch Run – conduit and wiring ***branching*** between power panel and EV charger

7. Conduit Network - pre-piped and pre-wired facility branch runs and main backbone / risers to provide equal access to EV charging power for all parking spaces



Power Distribution: Conduit Networks

- **Pre-run** ***conduit and wiring*** close to some or all parking spaces
- **Partial** EV Ready
- Typically, facility pays

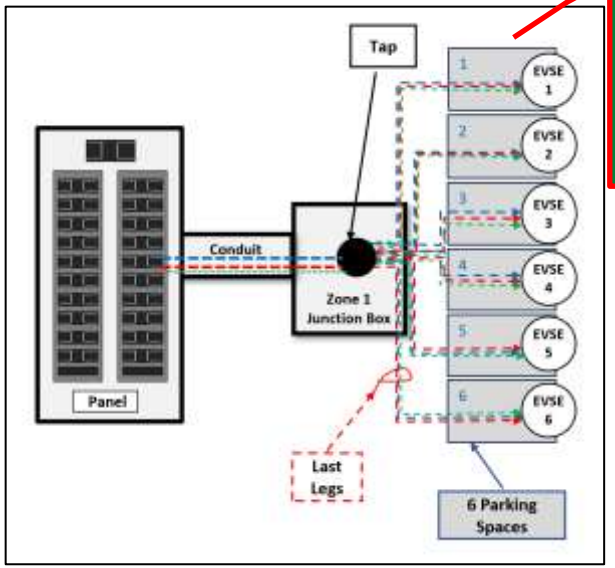


Investment variables
- Distances
- Number of spaces
- Number of nodes
- EV charging maximum amperage
- Use of power sharing
- Amount of future proofing
- Number of EV charging panels
- Sequencing

comed
AN EXELON COMPANY

Power Distribution: Last Leg and EVSE

- When EVSE is installed, also run “last leg” of branch circuit
  - Tie into conduit distribution network
  - Provides fairest distribution of power
  - Lower cost/EV Space- at high % EV parking
- Participating residents typically pay



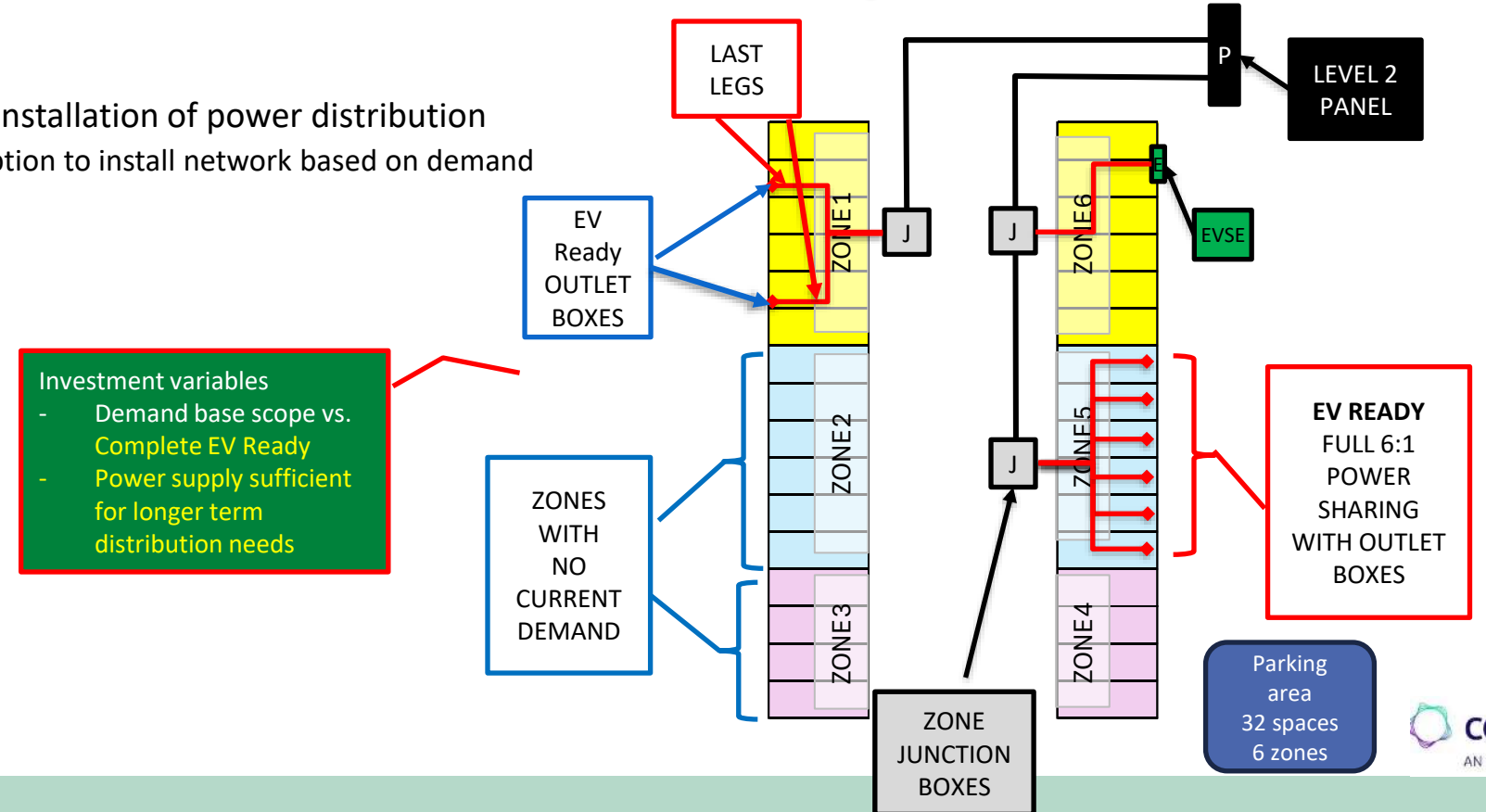
Investment variables
- EV charging maximum amperage
- Type of power sharing
- Power sharing ratio

comed
AN EXELON COMPANY

Distribution Options

Partial installation of power distribution

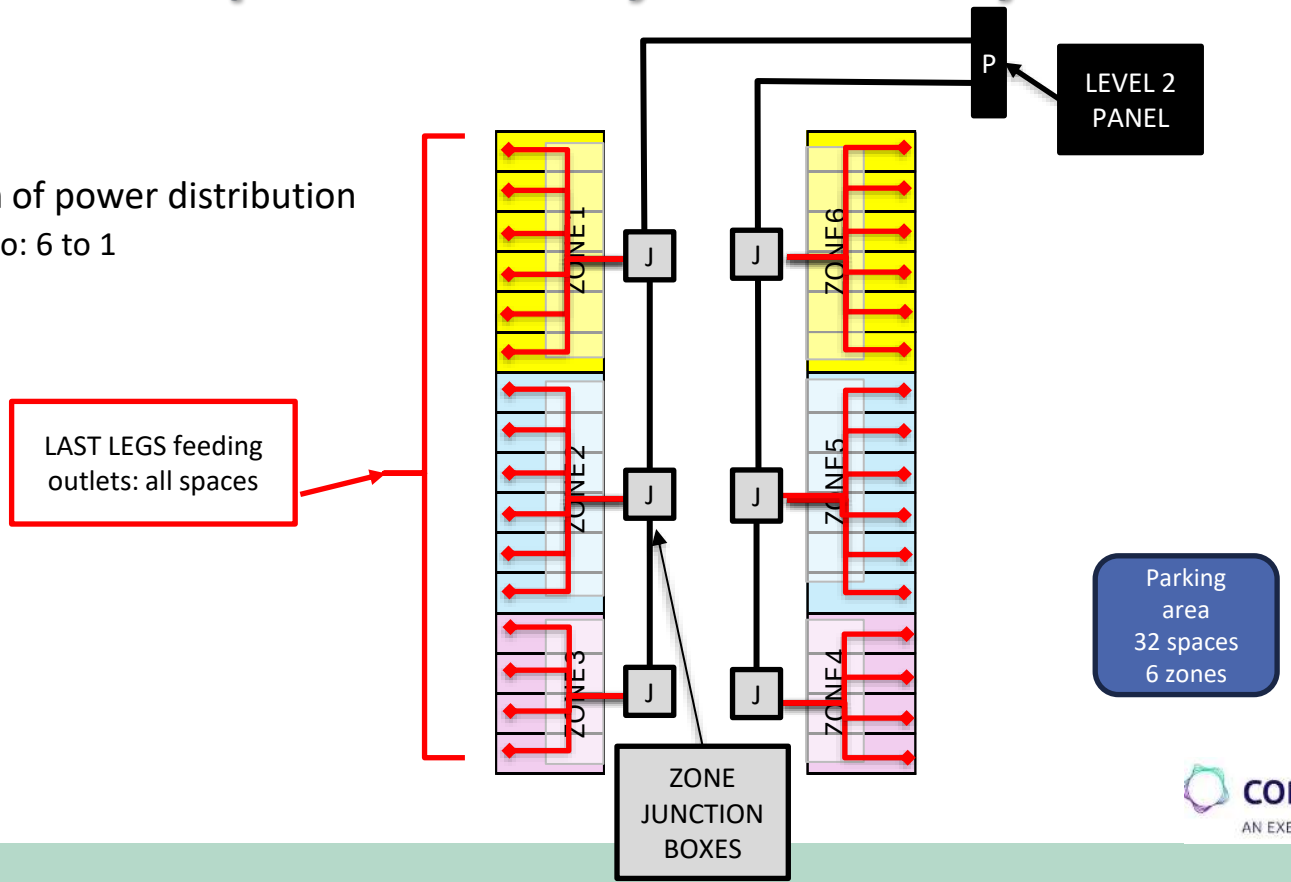
- Option to install network based on demand



comed™
AN EXELON COMPANY

Distribution Options: *Fully* EV Ready Site

- Full EV Ready installation of power distribution
  - Maximum Sharing Ratio: 6 to 1



comed™
AN EXELON COMPANY

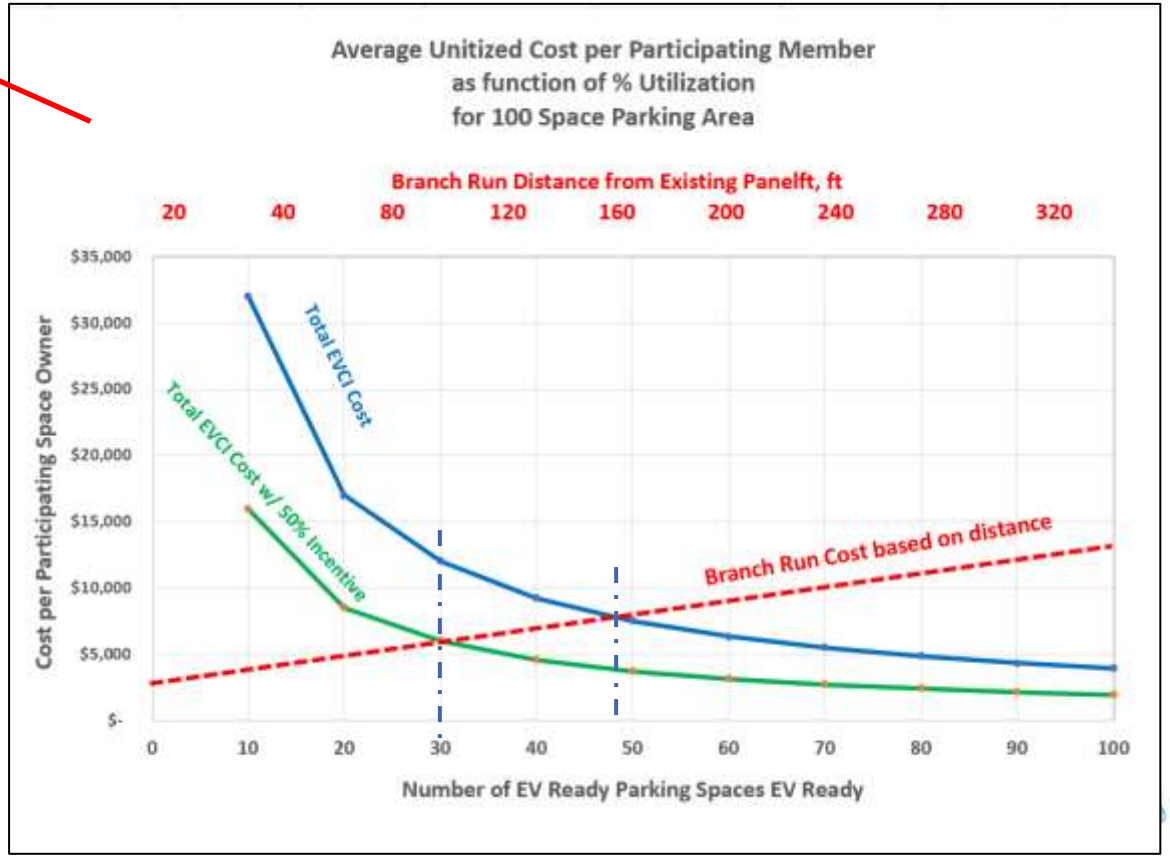
Decisions for Large Parking Areas (MFD)

- Hierarchy of installation options
  - ***Branch Runs*** from existing panels – often for early adopters
  - ***Power Supply Equipment*** considering future goals
  - ***Power Distribution Equipment*** based on interest
  - ***Full EV Ready solution*** for entire parking area
    - Most cost effective @scale
- Realities – 100% buy-in is difficult

comed™
AN EXELON COMPANY

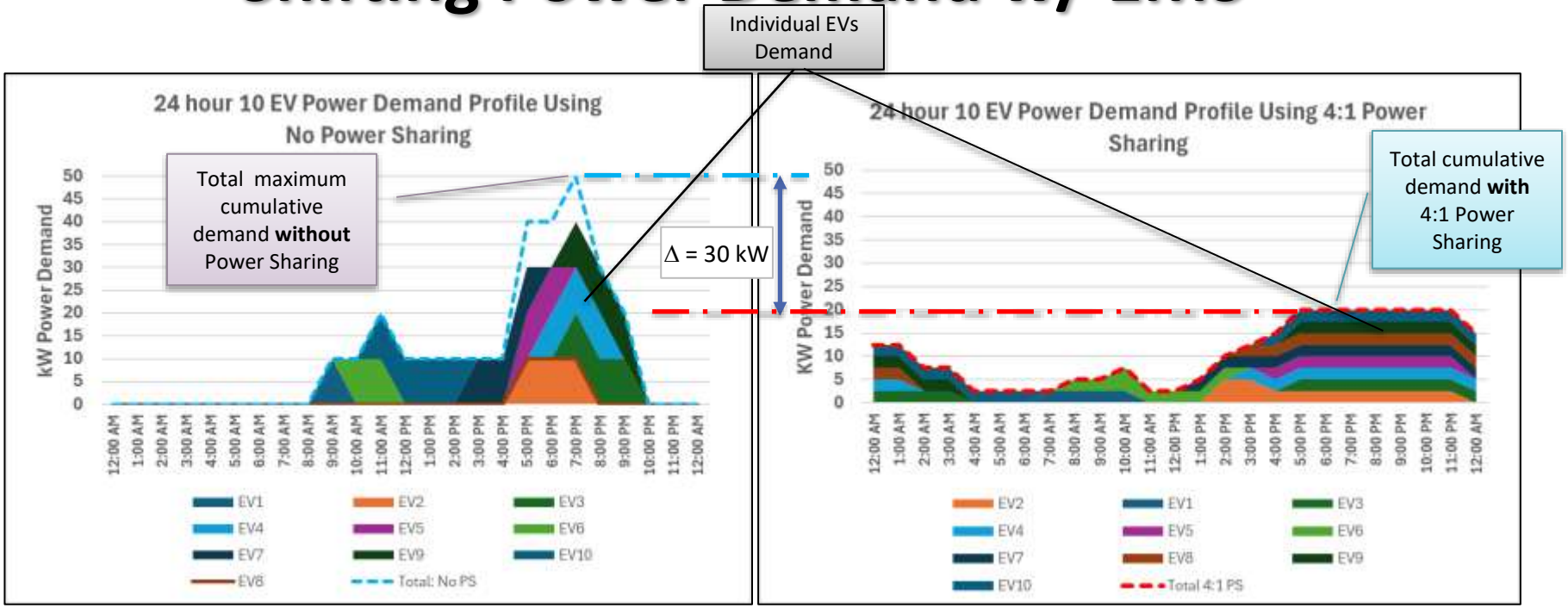
MFD Cost as % of Occupancy

Example based on 100 Parking Spaces



comed
AN EXELON COMPANY

Shifting Power Demand w/ EMS



@12 per peak kW x 30 kW → save $360 per month in demand charges

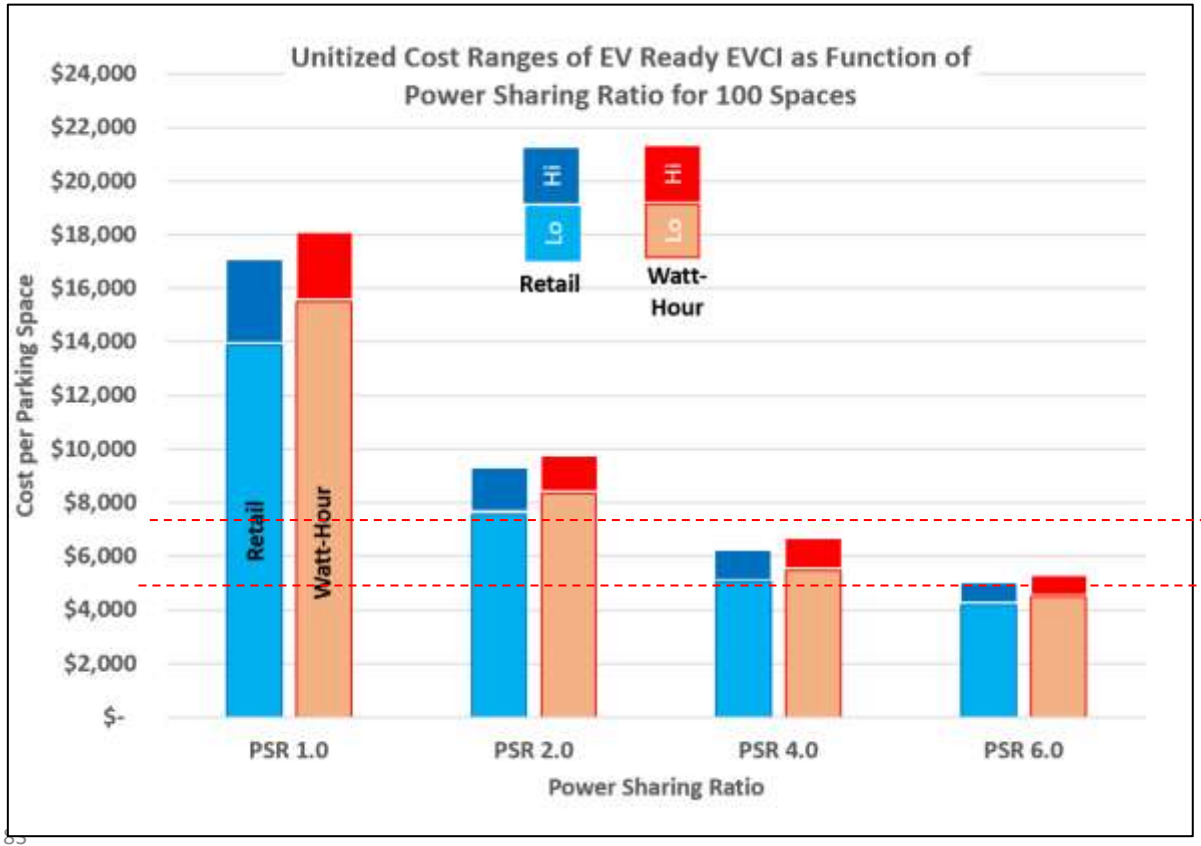
Cost Recovery Decision Factors

- **Pricing Options**
  - Charging as service
  - Cover costs
  - Recover investments
  - Generate revenues
- **Cost Recovery**
  - Who pays for what? When?
  - Manual vs. automatic billing
  - Communication network?
  - Money management, billing, markups
- **Incentives**
  - Availability & Eligibility
  - Amount
  - Timing

Level 2 Use Case Examples

- **Condo with indoor deeded spaces**
  - HOA pays for EVCI
  - EV Owners pay for last leg and EVSE
  - EV Owners pay for use of facility electricity, subscription fees, HOA allocations
- **Apartment building with outdoor parking**
  - Owner pays for EVCI
  - Owner pays for branch runs and EVSE
  - EV Owners pay for charging, including cost of electricity + cost recovery factors + profit

EV Ready Unit Cost vs. Power Sharing Ratio & Billing Type



Case:
50 of 100 spaces EVR

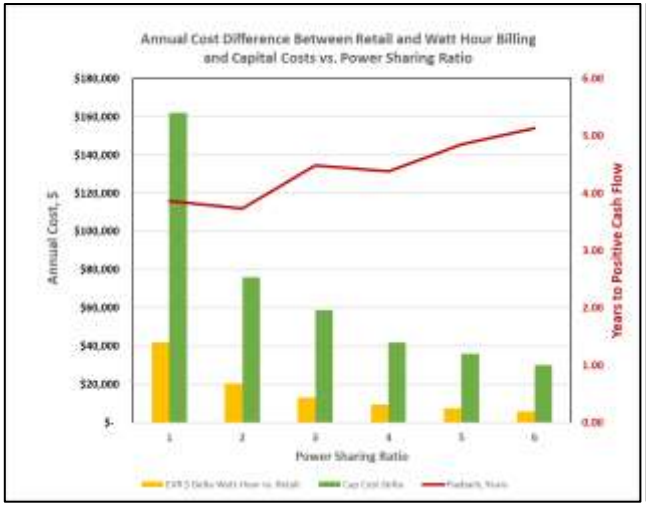
LIC/EIEC per EVSE

Base Make Ready per EVSE

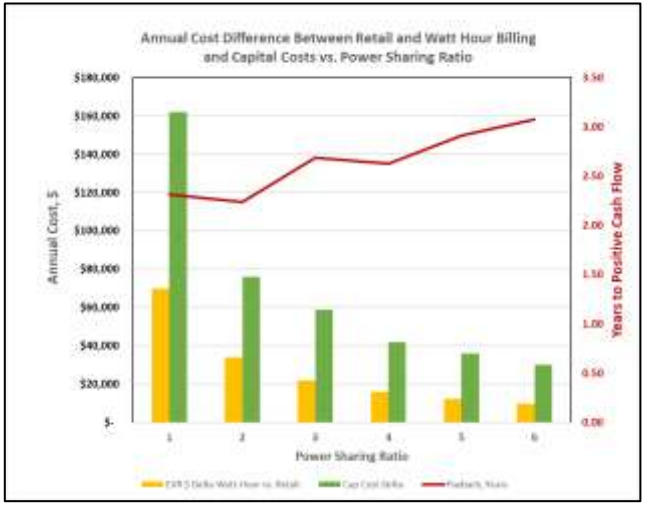
comed™
AN EXELON COMPANY

ROI Example - Capital vs. Demand Charge

- Basis:
  - x% of EV charging occurs during peak demand hours
    (9 to 6PM, M-F)
  - Vary Power sharing ratio
- 25 miles per charge



30% during peak



50% during peak

comed
AN EXELON COMPANY

Investment Cost Recovery

- ***Dedicated*** Charging (deeded, LCE Parking)
  - HOA is the bank, sometimes 3rd parties
    - Question- is EV charging an amenity (like a swimming pool) and paid for by association fees or should only those participating pay?
    - Investment paid down over time as new EV drivers install and share in infra as they join
  - Per parking space – each resident pays a portion
  - Per EV Driver – only participants pay
  - Resident commonly pays for branch run and EVSE in any case
- ***Shared*** Charging (rentals, Co-Ops, assigned parking)
  - Facility typically pays for investment
  - Recovers through usage or participation fees and EV charge fees
  - Can be cash ahead after 1- 2 years if used

comed℠
AN EXELON COMPANY

Biggest MFD Challenges

- Retrofit construction for deeded parking
  - Perceived by some as expensive proposition when adoption rates are low
  - Many residents drive few miles, may not own car
- Significant EVCI investments will pay off over time but may cost non-EV residents in the meantime. Incentives can offset this. Need to communicate value of adding EV charging capability to facility to current and future residents
- Early adopters may have to pay more for long branch runs if infrastructure investment minimized.
- Incentives
  - Have not been regularly available
  - Unclear incentives delay decisions
  - When available → move the demand needle.

Thank You

Tim Milburn

GREEN WAYS 2GO

Tim.Milburn@greenways2go.com

847-826-3314

www.greenways2go.com

comed™
AN EXELON COMPANY

Welcome Luke Burrows

Multiple Family Dwelling
Incentive Programs

IACT
ILLINOIS ALLIANCE FOR CLEAN TRANSPORTATION

comed℠
AN EXELON COMPANY

comed℠
AN EXELON COMPANY

walker-miller
Energy Services

January 29, 2026