

Nebraska Wind and Solar Conference

Contractor Webinar for Residential/Small Business Solar

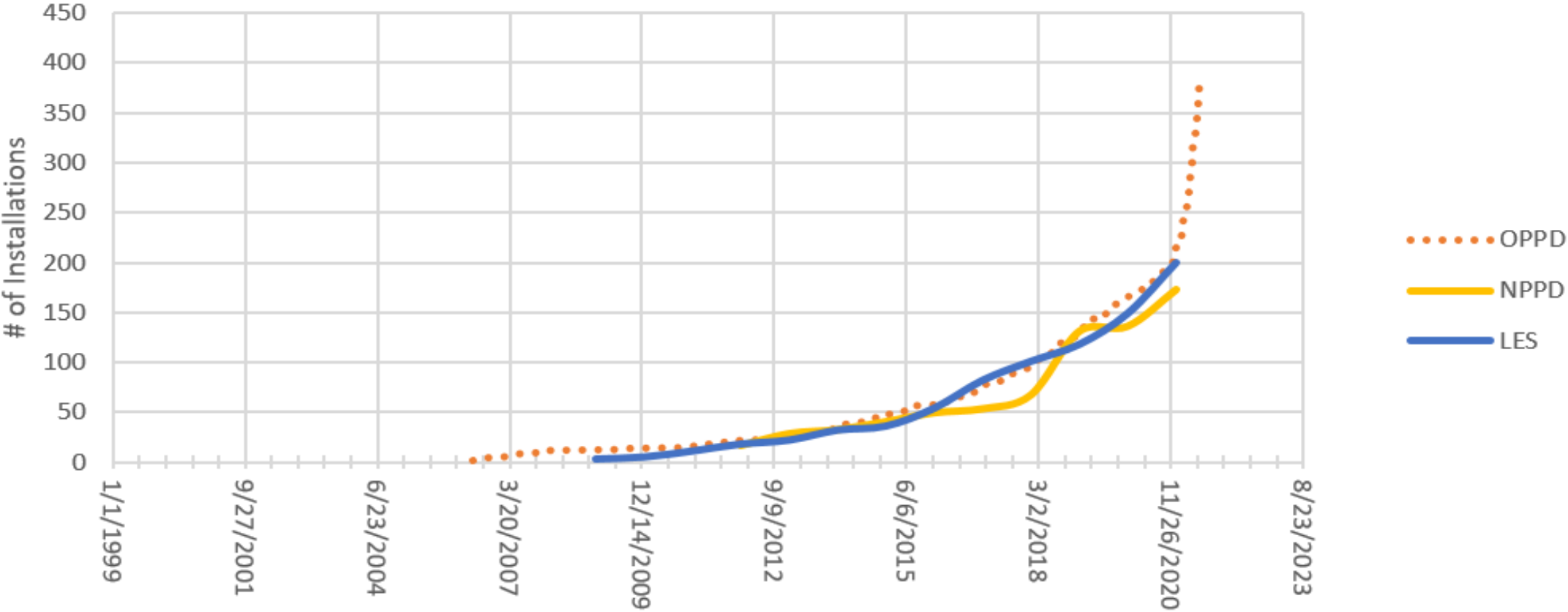
Tuesday, August 31, 2021

Presenters:

- Kirk Estee - OPPD
- Marc Shkolnick - LES
- David Rich - NPPD



Historical Solar Installations in Nebraska



Know Thy Local Utility Electric Rates



Question: Would a customer be billed if they used 0 kWh in a month?

Yes. But, why?



What is an electric rate?

A mechanism for utilities to recover **fixed** and **variable** costs in a fair and non-discriminatory manner.

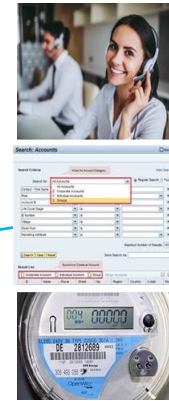
Fixed Costs



Variable Costs



Example Bill (LES)



Current Energy Charges

Energy Charge	1,220 kWh	\$97.72
Customer Charge		5.00
Facilities Charge - Level 2		26.00

Total Current Energy Charges \$123.99

Taxes & Other Charges/Credits

City Dividend	\$2.60
Sales Tax	9.18

- Over time utilities will transition to rate structures that can reliably recover fixed costs:
 - Move fixed costs out of variable energy rate
 - Implement demand charges



Example LES Bill

Current Energy Charges

Energy Charge	1,220 kWh	\$97.72
Customer Charge		5.00
Facilities Charge - Level 2		26.00

Total Current Energy Charges

\$123.99

Taxes & Other Charges/Credits

City Dividend	\$2.60
Sales Tax	9.18

- Total \$/kWh (net taxes and city dividend) with fixed and variable charges combined: $\$123.99/1,220 \text{ kWh} = \$0.10/\text{kWh}$
- \$/kWh for energy only: $\$97.72/1,220 \text{ kWh} = \$0.08/\text{kWh}$ (\$0.055/kWh winter)
- Which to use when determining solar impacts?



What's a reasonable energy rate annual escalator?

10-year Average Annual Full and Energy Rate Increases

2012-21	LES	OPPD	NPPD-Retail
Full Rate	1.3%	1.8%	1.0%
Variable Energy Rate Only	-1.7%	-2.1%	0.86%

Where to find rates:



<https://www.les.com/sites/default/files/rates-schedules-book.pdf>



Nebraska Public Power District
Always there when you need us

<https://www.nppd.com/accounts-billing/your-rates>



<https://www.oppd.com/residential/residential-rates/>

Note: If you cannot find the rates online, call the utility to find the rates.

Tools to use:

National Renewable Energy Laboratory PVWatts Calculator

<https://pvwatts.nrel.gov/pvwatts.php>

SYSTEM INFO

Modify the inputs below to run the simulation.

DC System Size (kW):

Module Type:

Array Type:

System Losses (%):

Tilt (deg):

Azimuth (deg):

+ Advanced Parameters

RETAIL ELECTRICITY RATE

To automatically download an average annual retail electricity rate for your location, choose a rate type (residential or commercial). You can change the rate to use a different value by typing a different number.

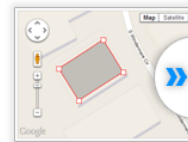
Rate Type:

Rate (\$/kWh):

RESTORE DEFAULTS

Draw Your System

Click below to customize your system on a map. (optional)



RESULTS

Print Results

5,685 kWh/Year*

System output may range from 5,295 to 5,905 kWh per year near this location.
Click [HERE](#) for more information.

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)	Value (\$)
January	3.12	328	25
February	4.11	377	28
March	5.07	505	38
April	5.57	525	39
May	6.37	594	45
June	6.76	592	44
July	6.76	599	45
August	6.42	566	42
September	5.79	511	38
October	4.60	445	33
November	3.66	353	26
December	2.81	291	22
Annual	5.09	5,686	\$ 425



Nebraska
Wind & Solar
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Tools to use:

[OPPD](#) & [NPPD](#) Solar Calculators

Electric bill calculations use electric rates derived from Nebraska state average data provided by the Energy Information Administration.

Save on electric bill \$864 First year View complete financial results	Incentives available 👉 \$5,577 Solar federal tax credit View incentives details	Reduce carbon 80% Per year Equivalent to either: 👆 Trees planted 73 🗑️ Tons of waste recycled 1.5	Steps to take ✓ Contact your local utility
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Let's review each step of your new plan

The traditional plan shows your alternative for each step of your plan. You can modify any of the steps according to your preferences.

⚙️ Install solar ✎ Modify

Traditional plan No solar Without solar, all your electricity comes from your utility.	My new plan Electricity comes from utility & solar 6.6 kW System size (DC) 22 Number of panels Annual energy from solar Show solar details
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Let's review your key financial results

These results factor in detailed financial assumptions for each step of your new plan. Consult with a qualified financial advisor to identify important considerations unique to your situation.

Solar financing Loan	\$21,450 20 yrs @ 5% 10% down	Compare options
Upfront cost Your initial out of pocket expense not including incentives	\$2,145	Show details
Incentives Available tax credits and rebates	\$5,577	Show details
Average monthly expenses Recurring monthly expenses in the first year	\$170	Show details
Lifetime savings Your net savings over the next 20 years	(\$5,770)	Show details
Breakeven Occurs when your net savings offsets your upfront investment	Not expected	Show details

The Utility Interconnection Process

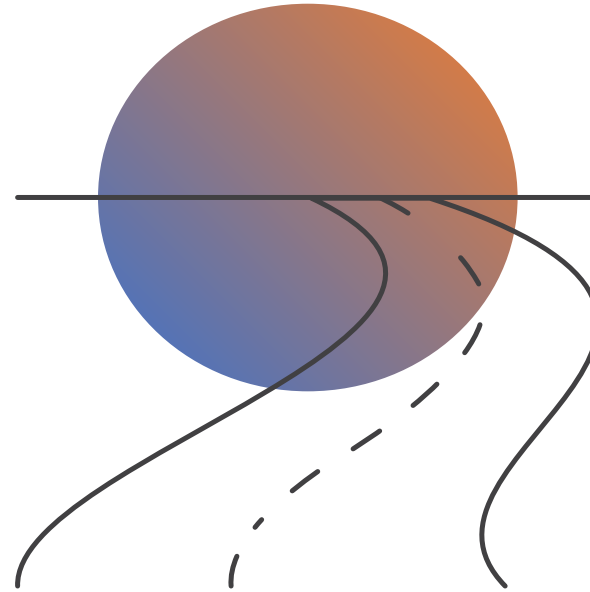


Why a Utility Interconnection Process???

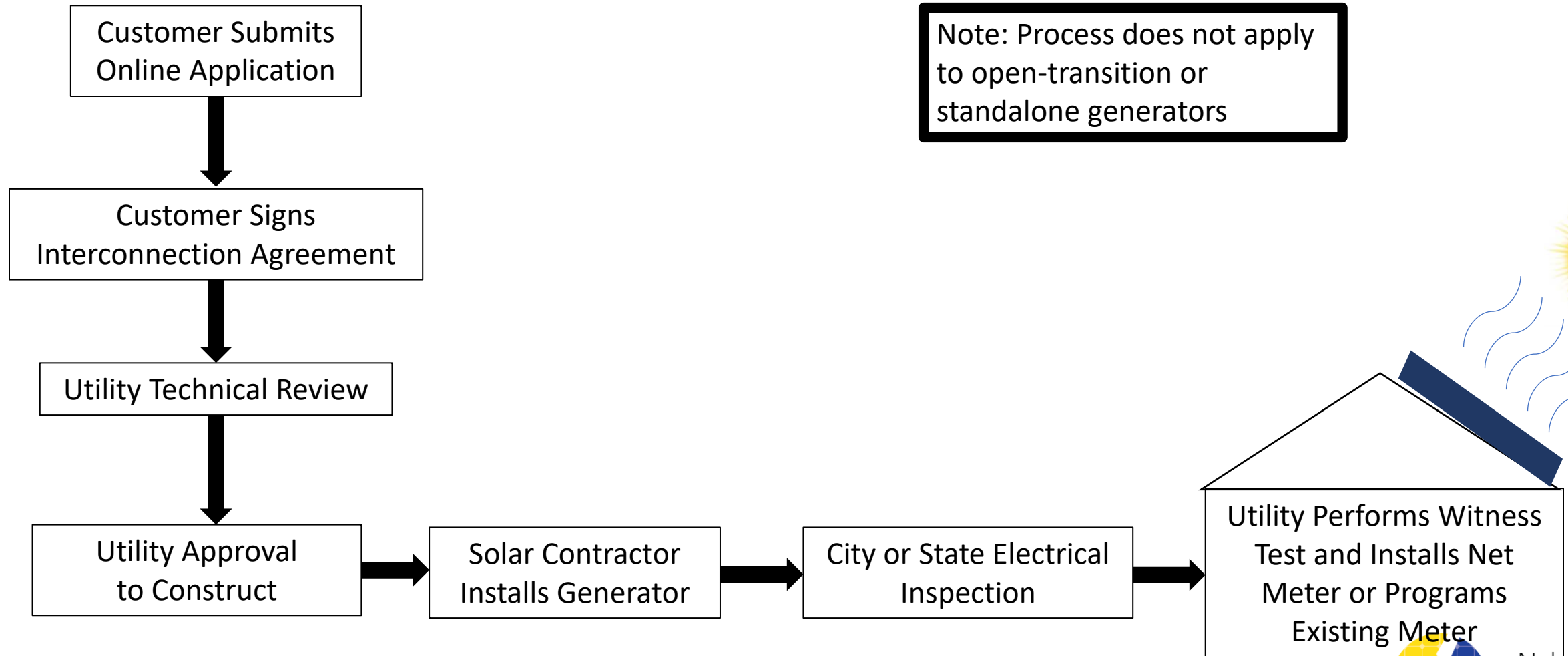
Utility needs safety for people and stability for the grid.



Customers need a timely and clear interconnection process.



Steps of the Interconnection Process




Interconnection Documents:

Nebraska Public Power District | 1
K450 Customer Generation Connection Application
K450-0421EF Retention Code Q20

**Nebraska Public Power District
Application for NPPD Approval to Connect
Distributed or Local Generation**

Table of Contents

- Application Process (Figure 1).....
- Terms and Conditions for Customer Generation Connection on Qualified & Non-Qualified Facilities >25KW
- Application and Connection Requirements (Table 1).....
- Form K450 – Application for NPPD Approval to Connect Distributed Generation.....
- Site Plan and Schematic Drawings – Samples and Worksheets.....
- Glossary
- Appendix A – NPPD Approved Customer Generation ≤ 25 kW Generation.....
- Appendix B –Customer Generation Connection/Operation Agreement for Non-Qualified Facilities ≤ 25 kW.....




OMAHA PUBLIC POWER DISTRICT

CUSTOMER-OWNED GENERATION INTERCONNECTION MANUAL

Operation of Customer-Owned Generation in Parallel with the Distribution System

This document contains the interconnection requirements for Customer Generation that operates in parallel with the Omaha Public Power District's Distribution System.



Form 970
11/2018

**COGENERATION AND SMALL POWER PRODUCTION
PARALLEL OPERATION, POWER SALES,
AND INTERCONNECTION AGREEMENT**

between

and
Lincoln Electric System

This Power Sales and Interconnection Agreement, hereinafter called the "Agreement", is made and entered into as of the ____ day of _____, 20____, by and between _____, hereinafter referred to as the "Owner" of the alternate energy generation equipment or "Facility" and the City of Lincoln, a municipal corporation of the State of Nebraska, acting through Lincoln Electric System, hereinafter referred to as "LES." The Owner and LES each may be referred to as "Party," or collectively as the "Parties."

WITNESSED: The Owner desires to install alternate energy generation equipment and has requested that it be interconnected to LES such that it operates in parallel with LES and LES may receive energy from such Facility. LES agrees to allow such interconnection subject to the following

Sample Online Application (OPPD)

1 COG Owner Information 2 Contractor Information 3 Equipment 4 Attachments

Interconnection Application for Customer-Owned Generation

The Customer-Owned Generation (COG) Owner (herein described as 'Owner') requests OPPD approval to construct and operate Customer-Owned in closed transition (parallel) with OPPD system in accordance with and as defined in the latest version of the OPPD COG Manual.

IMPORTANT INFORMATION!

- All Information indicated with a red * (asterisk) is REQUIRED!
- Click on each of the blue (?) dots to reveal helpful tips for guiding you through the application.
- Your information is automatically saved while working on this application.

COG Owner Contact Information ?

Name *

Company

Address *

Email *

Phone *

PV Solar Installation

PV Solar Mount Type *

Rooftop
 Ground

PV Inverter Type *

String Inverter
 Microinverter

If your PV System Inverter or Array is not listed in the PV System Specification lists below, select

PV System Specification * ?

Inverter

Qty	<input type="text" value="Qty"/>	<input type="text" value="Please select..."/>
-----	----------------------------------	---

PV Array [Delete Array](#)

Qty	<input type="text" value="Qty"/>	<input type="text" value="Please select..."/>
-----	----------------------------------	---

System Rating: Needs to be recalculated

Inverter Rating: Needs to be recalculated

Estimated Annual Production: Needs to be recalculated

Sample Online Application (continued)

1 COG Owner Information **2** Contractor Information **3** Equipment **4** Attachments

Upload Site-Specific Information

Site Plan *
 Browse
Allowed file types: .docx, .pdf

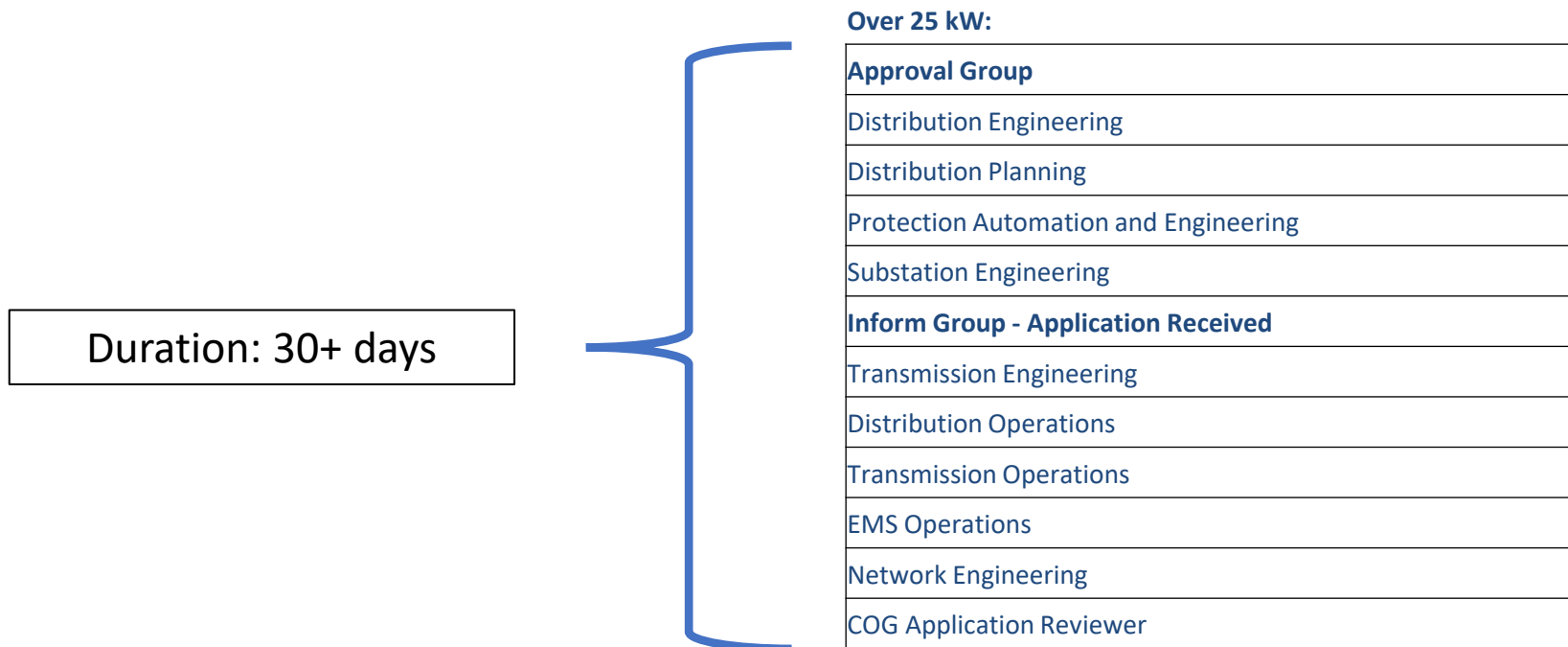
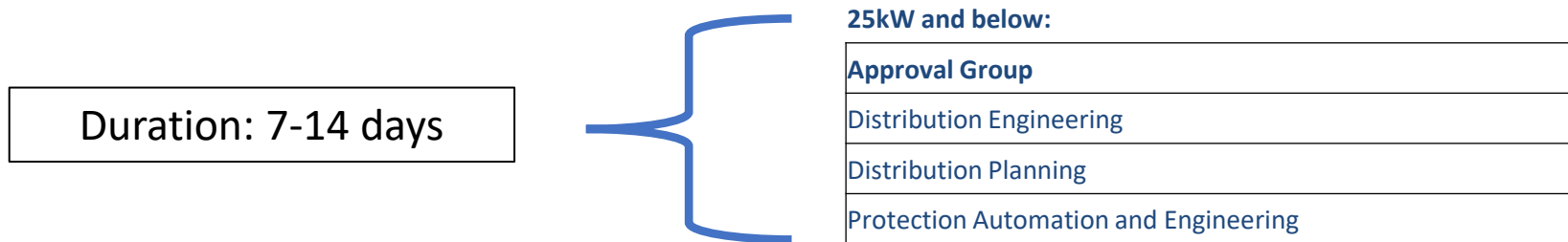
One Line Diagram *
 Browse
Allowed file types: .docx, .pdf

Interconnection Disconnect Manufacturer Data *
 Browse
Allowed file types: .docx, .pdf

Upload Equipment-Specific Information

Energy Storage Manufacturer Data *
 Browse
Allowed file types: .docx, .pdf

Utility Interconnection Technical Review Process



Note: Durations could extend considerably due to application errors or system complexities.

Utility Witness Test and Net Meter Installation / Programming

Purpose: Ensure installation matches application

Solar panels

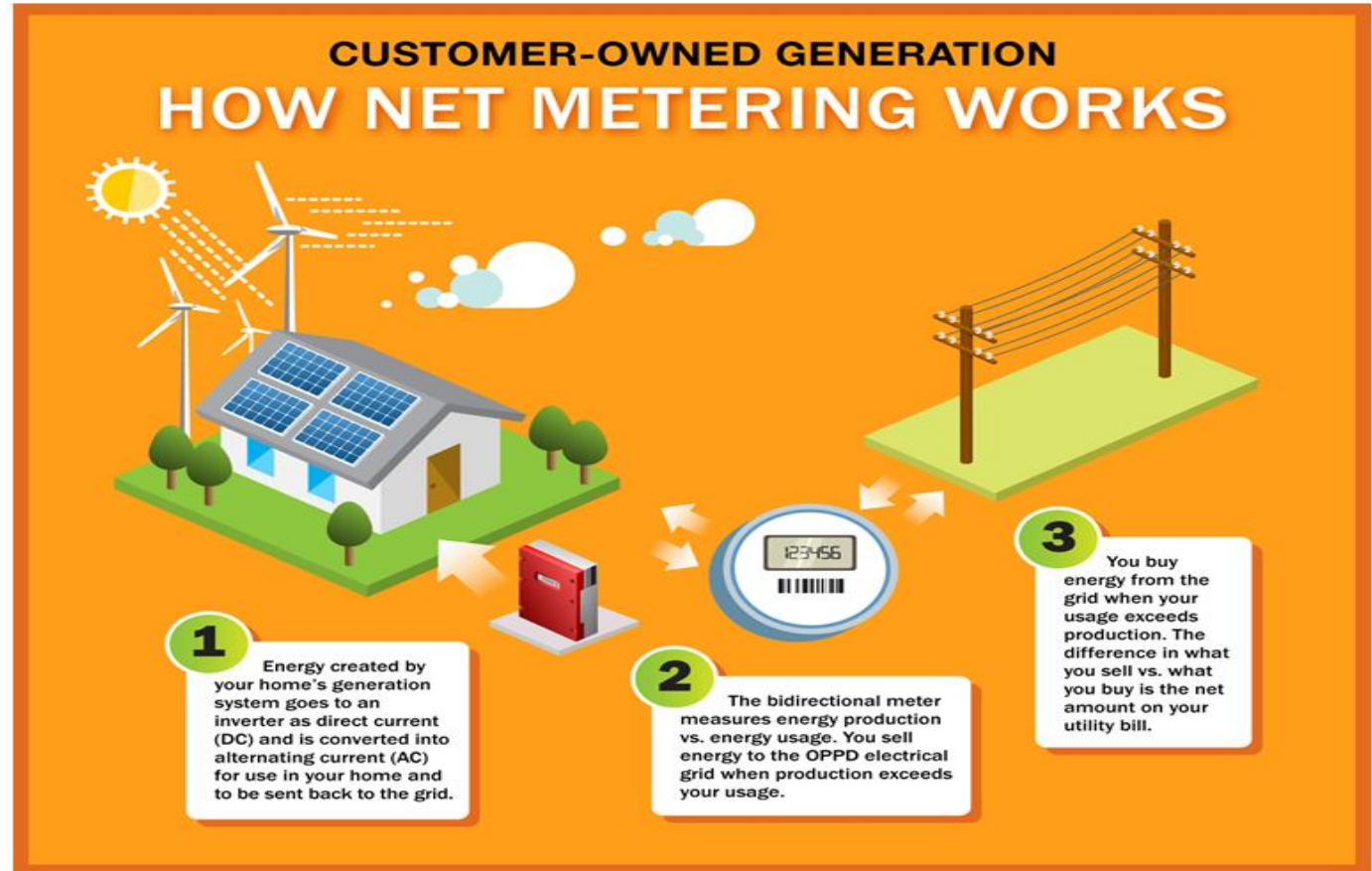
- Size
- Quantity

Inverter(s)

- Size
- Quantity

AC Disconnect

- Location
- Make and Model



The Utility Interconnection Agreement



Why are Solar Interconnection Agreements Necessary?

- The customer with generation can potentially create safety and power quality issues
- Excess generation from a PV Solar project will flow to the utility distribution grid and be consumed by closest loads, neighbors
- Approved equipment, Rapid shut down inverters and AC disconnects protect utility lineman during an outage
- Generating 120/240V back through a distribution transformer will produce 7,200-13,800 Volts on the distribution wires where lineman are working.

Utility Trade Ally Program



OPPD Customer-Owned Generation (COG) Trade Ally Program (under development)

Overview

- Contractor attends periodic utility-led training sessions
- Training for solar contractors, electricians, City/State electrical inspectors, stakeholders, etc
- Contractor signs agreement

Goals

- Improve knowledge
- Improve alignment among all parties
- Improve experience for Nebraska COG customers

OPPD COG Trade Ally Program (under development)

Benefits to Contractor

- Ability to offer utility rebates (when available)
- Referral source - Listing on utility website

Benefits to Customer

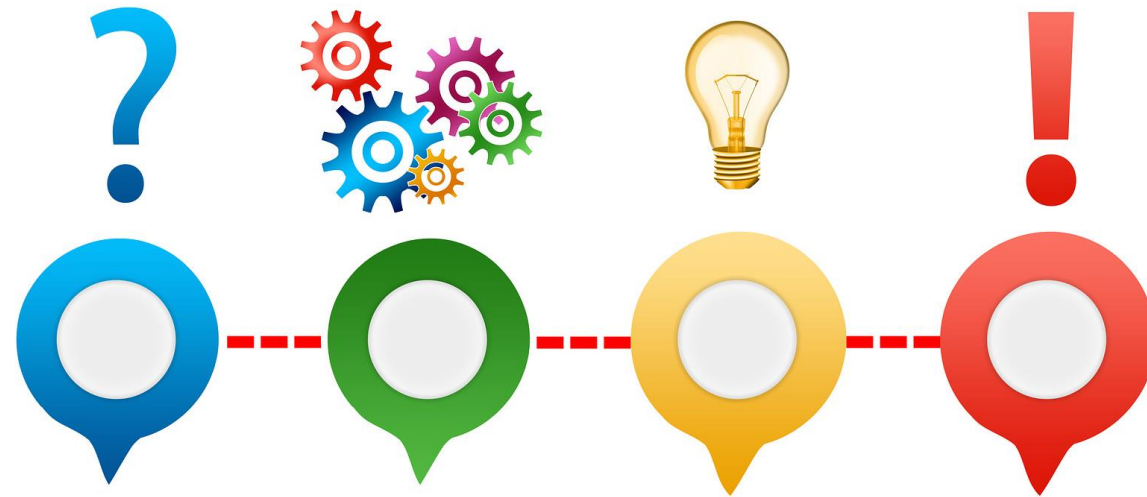
- More knowledgeable contractors
- Satisfaction from proper expectations

Benefits to Utility

- Higher application approval rates
- Higher witness test pass rates
- Higher overall customer satisfaction



Questions?





14TH ANNUAL

Nebraska Wind & Solar

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November 8-9, 2021 | Lincoln, NE

www.nebraskawsc.com



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Contractor Webinar for Residential / Small Business Solar

Tuesday, August 31st
10:00 AM

Featured Presenters:



Kirk Estee
Omaha Public
Power District



Marc Shkolnick
Lincoln Electric
System



David Rich
Nebraska Public
Power District

