Demand Response:

OpenADR Deployment Survey

Intelligent energy controls exist in the current market, but previous research[1] shows that these controls lack sufficient OpenADR integration to perform automated demand response (ADR) actions. To effectively enable demand response, intelligent energy controls should include (at a minimum):

1. A demand response mode user display that is easily accessible
2. Two to three load control options, ideally with a factory-set default option
3. An OpenADR virtual end node solution integrated or available as an add-on

Stakeholder feedback indicates that manufacturers and distributors are looking evidence of increased market demand before they invest further in OpenADR integration. Existing information on the ADR market is comes from Lawrence Berkeley National Laboratory's (LBNL's) OpenADR Map created in 2012 and maintained until 2014. The 2021 SCE research updates the assessment of OpenADR users through a survey of stakeholders.

SURVEY

The survey used to investigate this issue targeted feedback from utilities, virtual end-node manufacturers (VEN; a device that accepts signal from a server), virtual top node (VTN; a server or device that transmits a signal to VENs) manufacturers, aggregators, and other industry stakeholders. The survey was distributed to 431 contacts and received 84 responses. Figure 1 shows the respondents by their role(s).[2]

Figure 1. Stakeholder Type
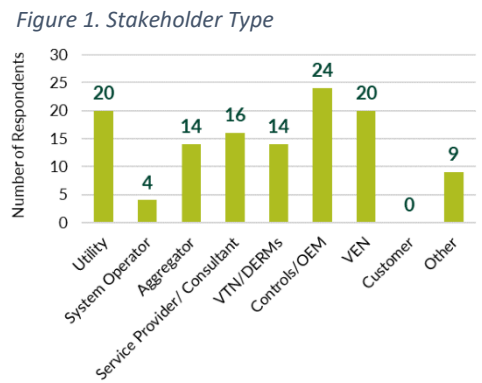
RESULTS

This research produced several key takeaways related to OpenADR.

- Adoption has increased significantly since 2014
- 90% of all programs are located in western US
- Programs commonly target multiple sectors and end-uses
- VEN manufacturers are emphasizing electric vehicle charging and batteries more than ADR programs
- Nearly 99% of VEN sales were cloud-based technology

Since 2014, the number of programs using OpenADR has increased from 34 to 201. Table 1 compares this research to 2014 LBNL OpenADR adoption. Of the 201 programs identified, only contacts provided details on only 19 of them. These programs are listed in Table 2.

Table 1. Comparison of 2021 and 2014 OpenADR Results

Category	2021	2014
Programs Identified	201	34
US Utilities Identified	21	10
International Utilities Identified	11	4
US States Identified	25	8
Countries Identified	6	8

[1] Southern California Edison (SCE) projects DR18.10 and DR18.11.

[2] A respondent could indicate more than one role which explains the sum of data points is greater than the number of respondents (84).

| United States	International
Austin Energy	Tokyo Electric Power Company
City of Tallahassee Electric & Gas Utility	Kansai Transmission and Distribution
Consolidated Edison	Taipower
CPS Energy	Transpower New Zealand
Eversource	
Fort Collins Utilities	
Hawaiian Electric Company	
National Grid	
New Hampshire Electric Cooperative	
NV Energy	
Pacific Gas and Electric	
Portland General Electric	
Sacramento Municipal Utility District	
Salt River Project	
San Diego Gas & Electric	
Southern California Edison	

The total megawatts either planned or enrolled in all programs is 620 MW. Figure 2 shows that 90% of all programs are located in the western US. Previous research found that California's ADR incentive program is a strong driver for sustained engagement in ADR as most customers remain in the programs even after they receive incentives.[3]

Figure 2. OpenADR Programs by Region
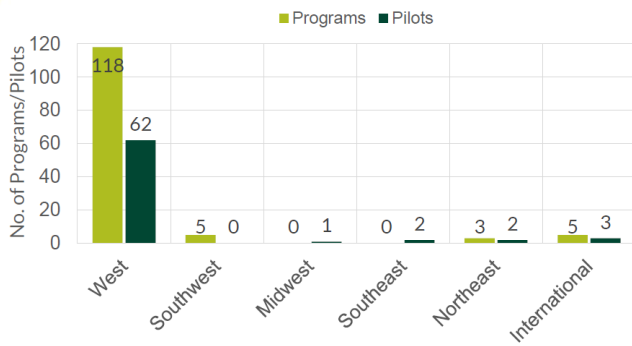
Where sufficient detail was provided, OpenADR programs are covering multiple sectors and end uses. Figure 3 shows that commercial and residential sectors are the primary market for ADR programs. Additionally, these ADR programs targeted primarily energy management systems (EMS), thermostats, and water heaters.

Figure 3. Number of Reported Programs by Market Sector and End-Uses

TARGETING EACH MARKET SECTOR

TARGETING EACH END-USE TECHNOLOGY
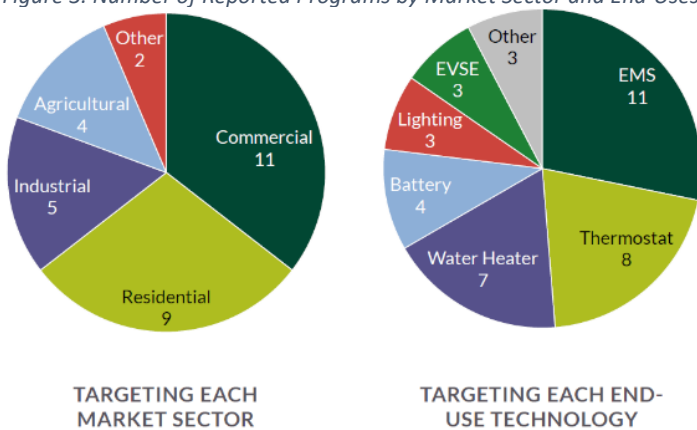
[3] Energy Solutions. August 6, 2020. Automated Demand Response Non-Residential Incentive Structure Research Project (PGE0452.01). Automated Demand Response Non-Residential Incentive Structure Research Project | ETCC (etcc-ca.com)

This survey also collected information on the type of VEN products manufactured and distributed. According to the survey responses, VEN manufacturers are targeting electric vehicle supply equipment (EVSE) and batteries more, relative to the number of programs that support them.

Figure 4. Targeting End-Uses for ADR: Programs vs. Manufacturers
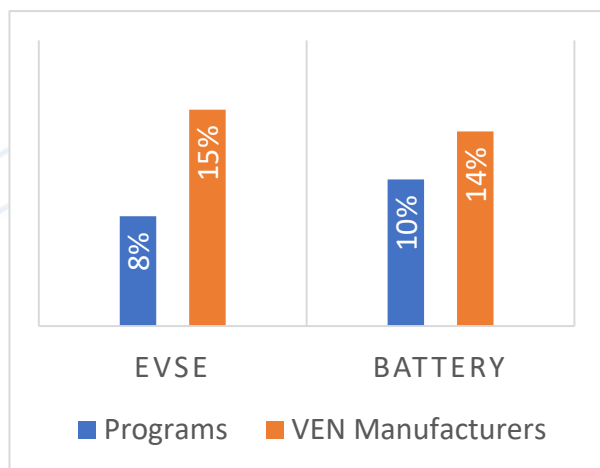
The VENs themselves are overwhelmingly (99%) cloud-based and based on historic district distribution, mostly OpenADR 2.0a products.[4] The predominance of 2.0a products is likely due to historic sales not likely indicative of future market preference.

Figure 5. Reported VEN Sales by Type
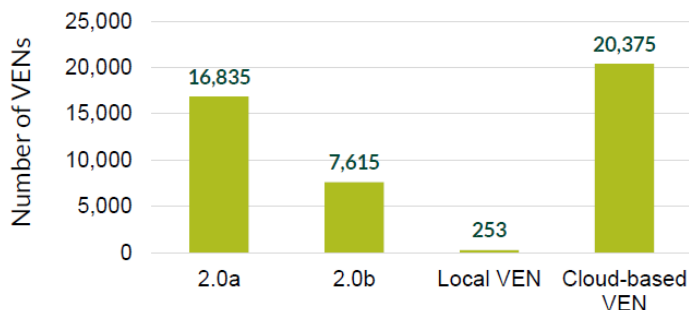
CONCLUSIONS

The research found over 200 programs using OpenADR, a significant increase in OpenADR adoption since the previous survey in 2014. This increased market penetration should help manufacturers justify further investment in the OpenADR. If investment in OpenADR is increased, the market should see a growth in available ADR technologies and solutions, leading to growth in ADR program enrollments.

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[4] From OpenADR.org: "OpenADR 2.0a, released in August 2012, supports the simplest devices installed in commercial, industrial and residential environments to enable broad-based and completely automated participation in DR events. OpenADR 2.0b is designed for more sophisticated devices and will support most DR services and markets. It includes flexible reporting capabilities for past, current and future data reports."