DNV GL
Load Research & Analytics
Global Best Practices Survey
Summary Findings

SAFER, SMARTER, AND GREENER

Agenda

1. Survey Instrument
2. Selection Criteria
3. Participants
4. Selected Results

Load Research Global Best Practices Survey

1. Survey Instrument | 2. Selection Criteria | 3. Participants | 4. Results

- Utility Overview – 10 Questions
- Program Overview – 10 Questions
- Meter Data – 18 Questions
- Data Validation & Estimation - 10 Questions
- Client Reporting – 7 Questions
- Staffing & Budgeting – 16 Questions
- Future Analytics – 2 Questions
- Wrap Up – 11 Questions

Load Research Global Best Practices Survey

Utilities that adhere to, and lead in Global Best Practices in the Load Research Field

Utilities willing to participate in completing survey

Utilities that could provide diversity and comparability with client

Selection Criteria										
A. Leading LR Program	**B. Likelihood to Participate**	**C. AEIC LR Member**	**D. Utility Organization**	**E.Utility Structure**	**F. Utility Ownership**	**G. Market Set up**	**H. Market Regulator**	**I. Solar Penetration**	**J. Water Coverage**	**K. Climate**
(Y/N)	(Low, Med, High)	(Yes, No)	(Vertical, OpCo, Muni)	(Vertical / Sub)	(Type)	(Reg., De-Reg., Self)	(State)	(Low, Med, High)	(Yes, No)	(Hot, Summer Peak, Both)

Load Research Global Best Practices Survey

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AEP American Electric Power
Dominion Energy
Southern California Edison
OGE Energy Corp.
Pepco Holdings Inc
SRP
Alabama Power
Gulf Power
Portland General Electric
Puget Sound Energy
CPS Energy
MGE Madison Gas and Electric
ConEdison
Austin Energy
Pacific Gas and Electric Company
Duke Energy
JEA Jackson Energy Authority
SDGE

essent

innogy

npower

Key results focused around following topics:

- Data access
- Data governance
- Internal Clients
- Reporting
- Staffing & Budgeting
- Current & Future Analytics
- Improved Automation

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Name and Placement

Utility	Group Name	Department
Utility 1	Load Research	Central Customer Services
Utility 2	Customer Rates	Rates
Utility 3	Load Research	Rates
Utility 4	Load Analysis	Rates
Utility 5	Load Research & Market Settlements	Regulatory
Utility 6	Load Research	Load Forecasting
Utility 7	Regulatory Costing & Pricing	Regulatory Affairs
Utility 8	Forecasting & Load Research	Regulatory Forecasting & Pricing
Utility 9	Load Research	Rates
Utility 10	Load Research	Rates
Utility 11	Demand Side Analytics	Energy Portfolio Analytics
Utility 12	Forecasting & Optimization	Corporate & Financial Planning
Utility 13	Load Research/Rate Engineering	Customer Energy Solutions
Utility 14	Utility Analytics	Customer Organization
Utility 15	Rates and Forecasting	Corporate & Financial Planning
Utility 16	Regulatory Analytics and Research	Rates
Utility 17	Load Research	Customer Solutions

Load Research Global Best Practices Survey

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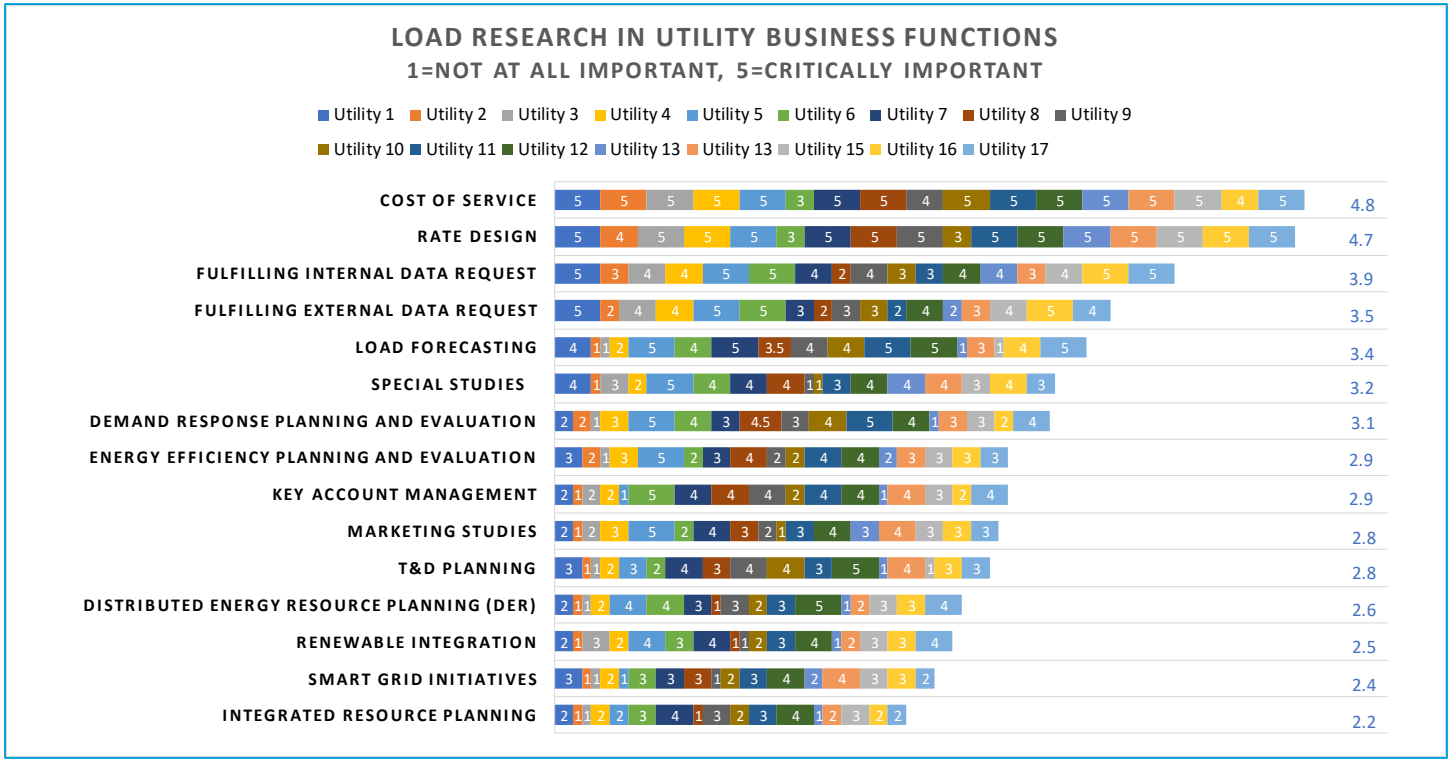

Cost of Service and Rate Design rank high in business function served followed by fulfilling data requests, load forecasting and special studies

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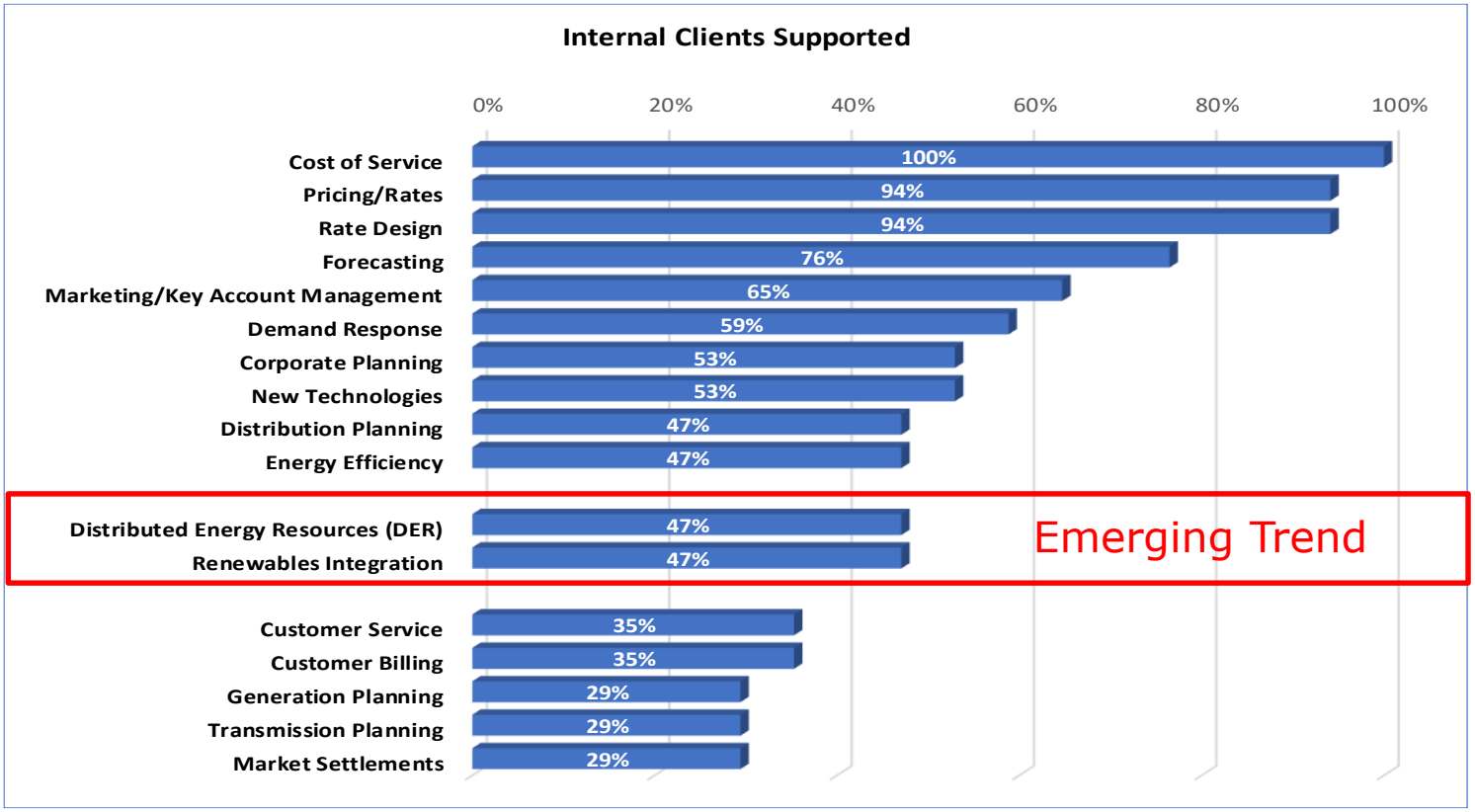

Key clients remain rates, pricing, and load forecasting, but many respondents see increasing research demands for DER analysis

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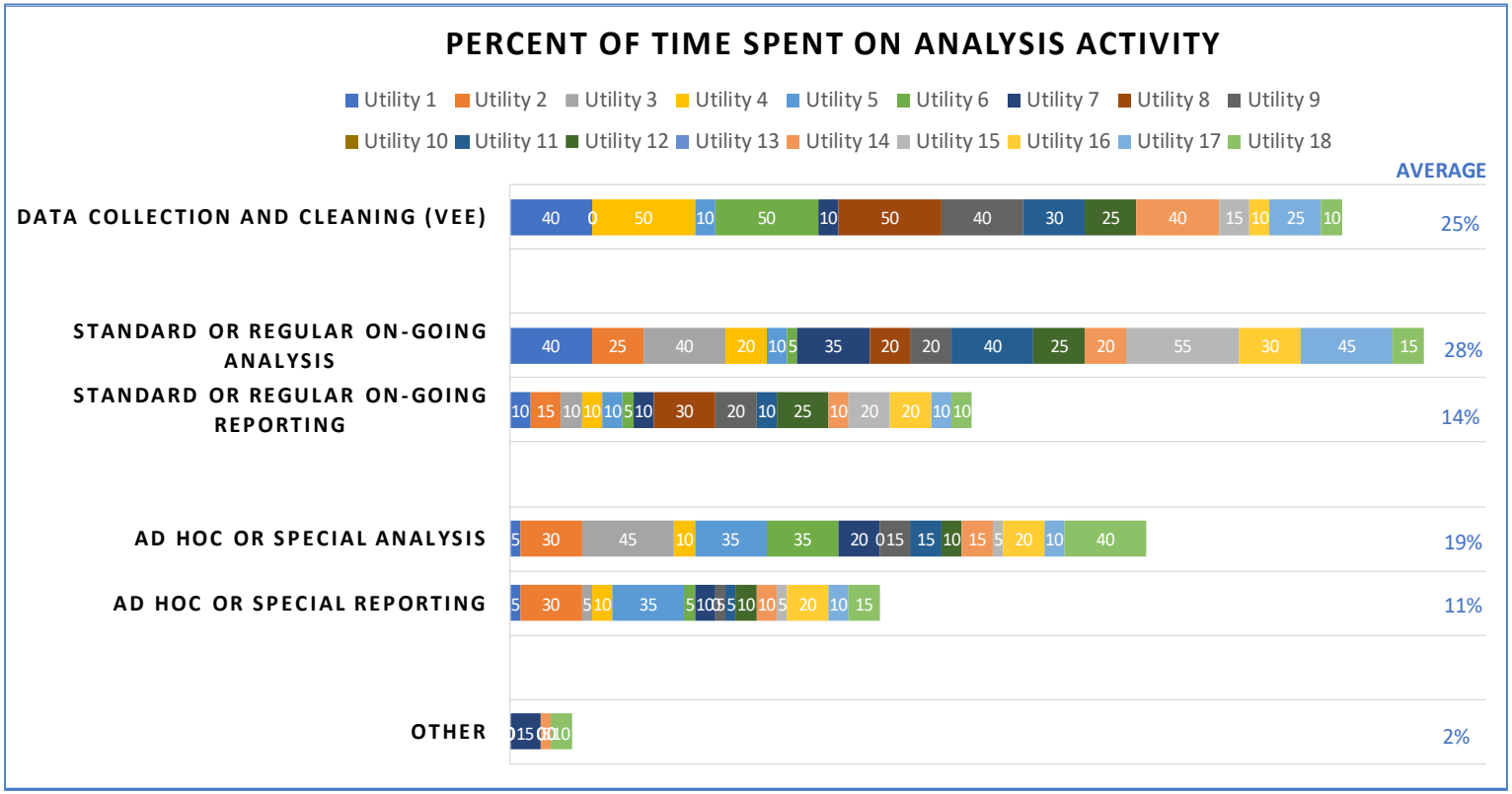

Data collection and cleaning showed the most range in responses (0% to 50%). Some utilities reported that implementing rigid data processing procedures in upstream data collection organizations allowed their teams to focus exclusively on analysis and reporting.

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Sample Sizes

Utility	AMI Percent Deployed	Sample Sizes			
		Residential	Commercial	Industrial	Other
Utility 1	50	120	60-400	Census	
Utility 2	15	700	850	350	850
Utility 3	100	10,000	20,000	Census	Census
Utility 4	100	Census	Census	Census	Census
Utility 5	75	120	100	100	
Utility 6	99	Census	Census	Census	
Utility 7	99	160	420	600	
Utility 8	99	400	650	250	
Utility 9	99	1,900	4,500	600	3
Utility 10	5	N/A	N/A	N/A	
Utility 11	100	500	500	Census	500
Utility 12	6	7,500	1,800	5,650	50
Utility 13	15	839	1,882	200	
Utility 14	60	500	2000	200	100
Utility 15	99.9	230	950	32	
Utility 16	100	22,628	35,919	6,418	
Utility 17	60	2,006	1,447	1,203	13,902
Utility 18	N/A	300	500	Census	

Only two (2) utilities said they were using full population of AMI Data

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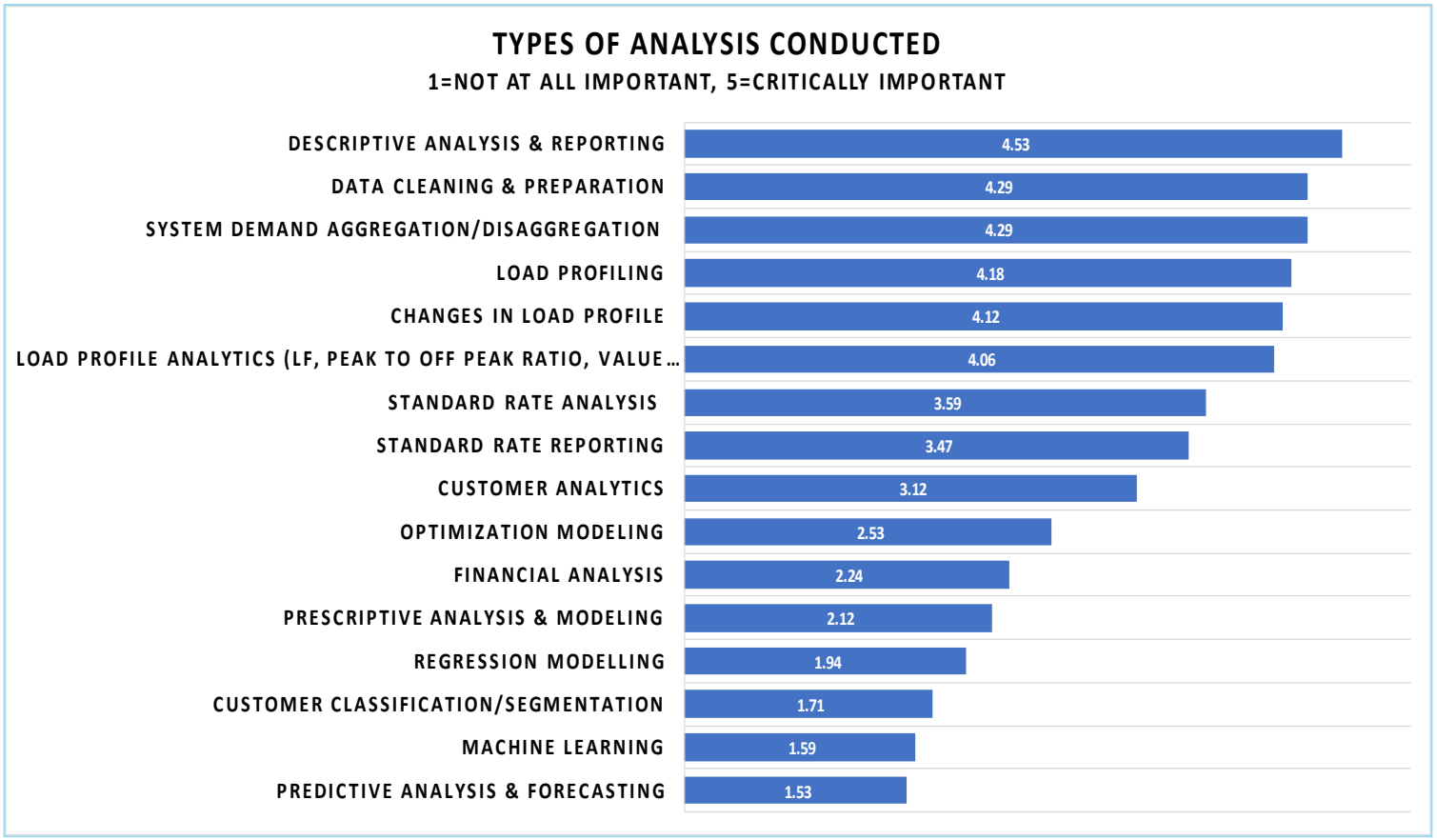

Descriptive analysis and analysis required to prepare data top analysis conducted

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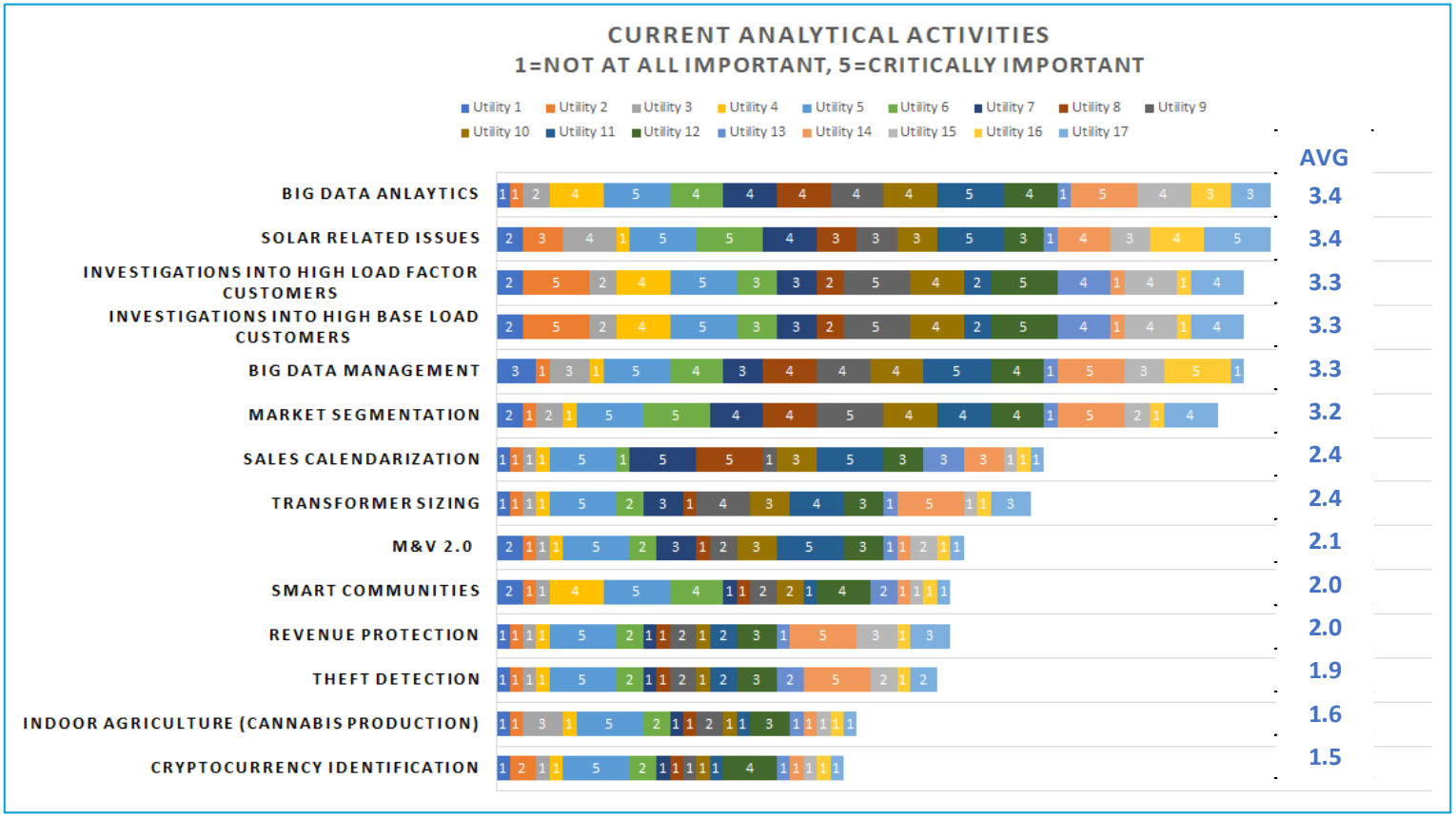

Advent of AMI data availability opens up opportunities for enhanced analytics, but data management and quality still critical to process

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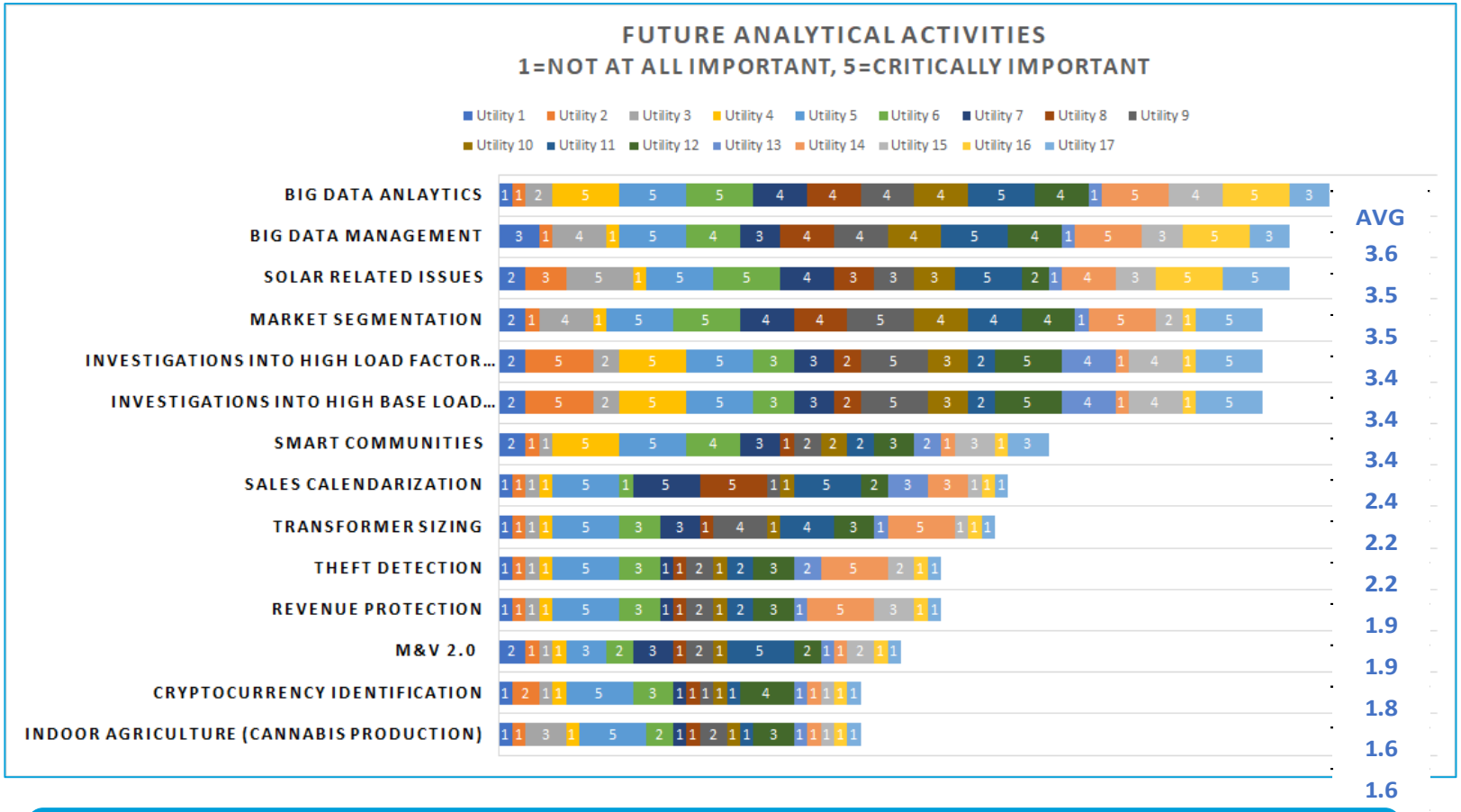

Big data analytics and big data management becoming most important future activity

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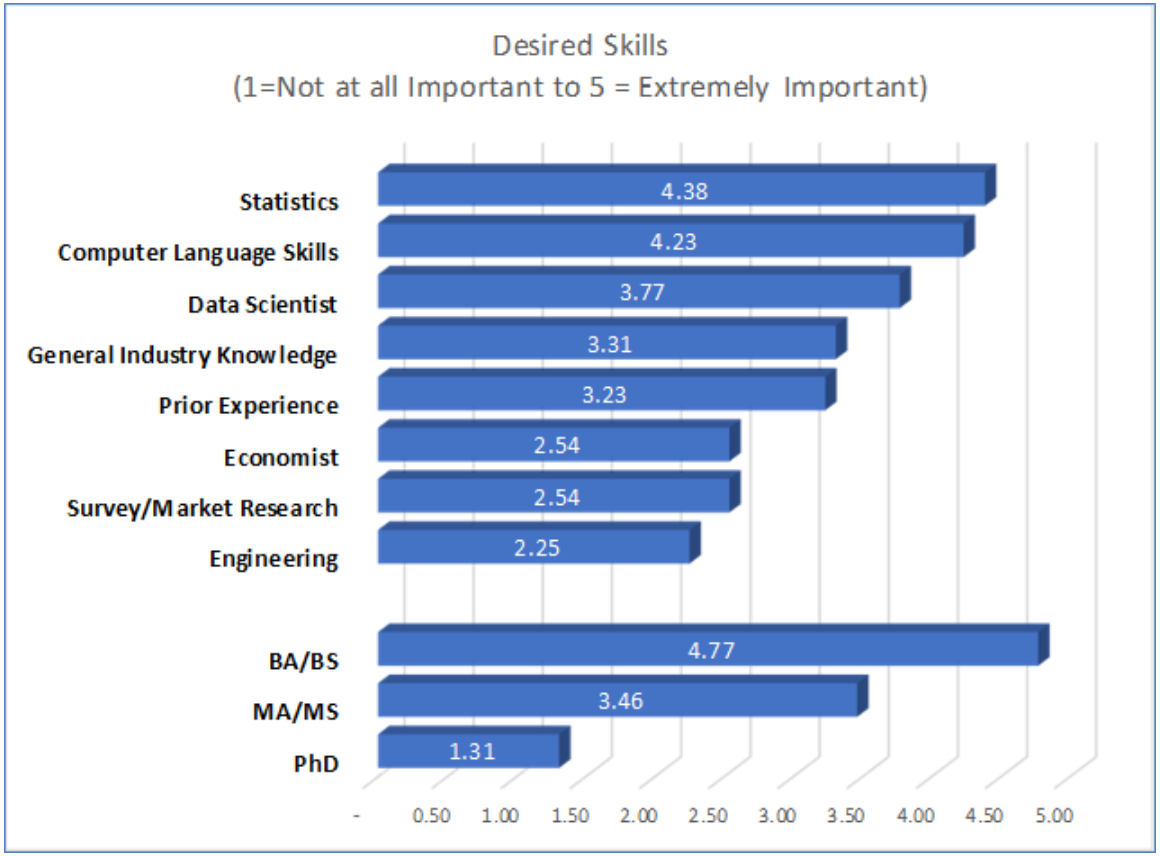

Statistics and software development skills key

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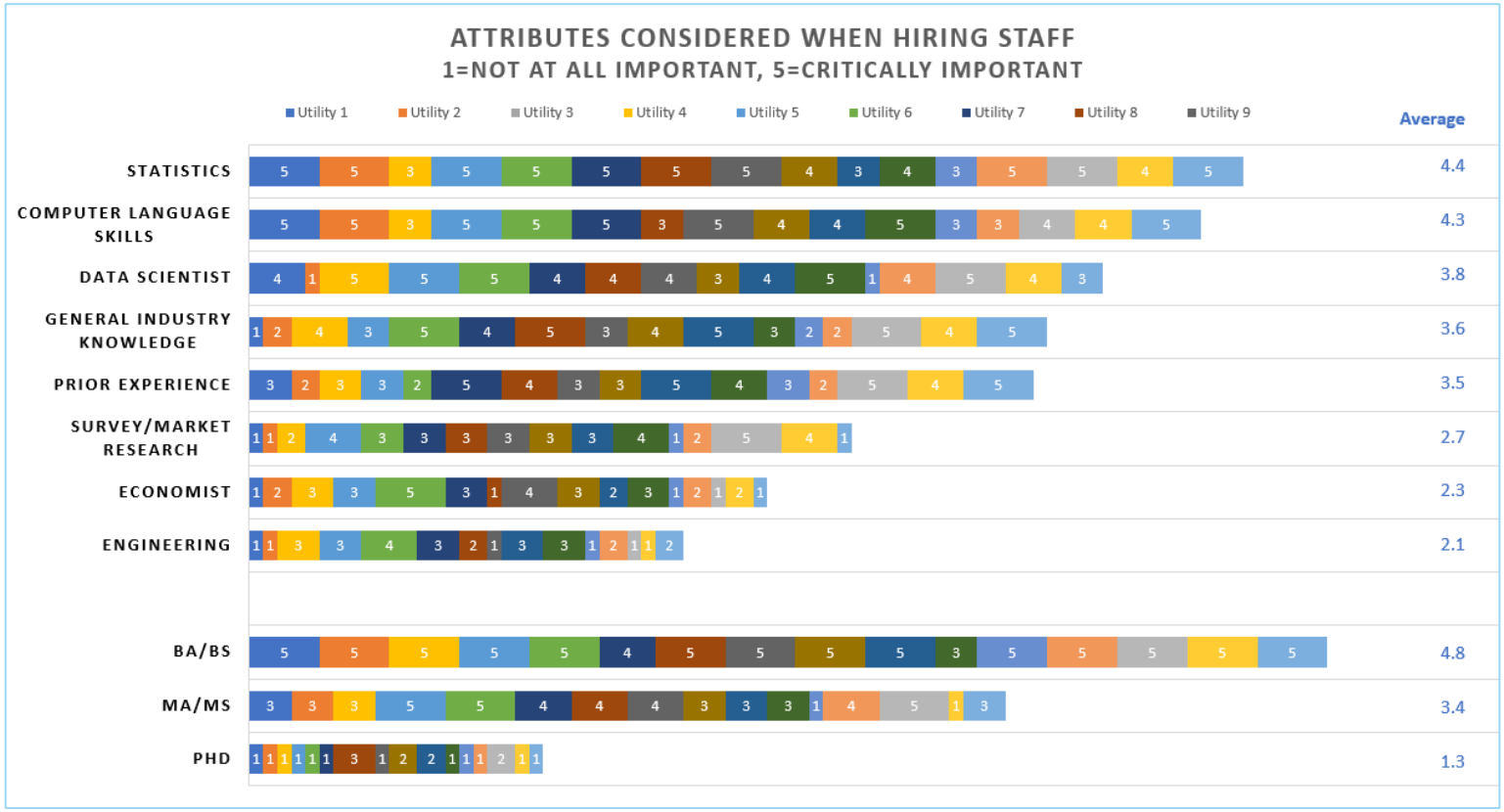

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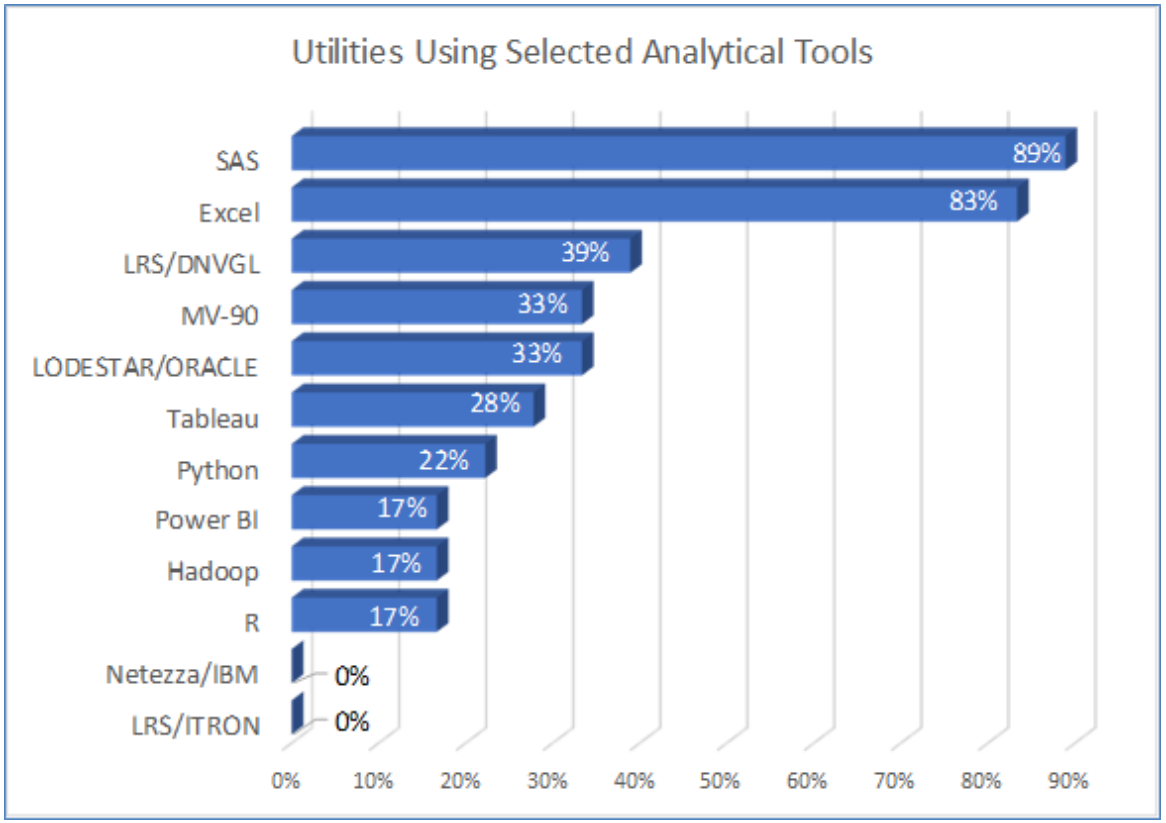

SAS remains dominant analytical tool, but open source tools gaining ground

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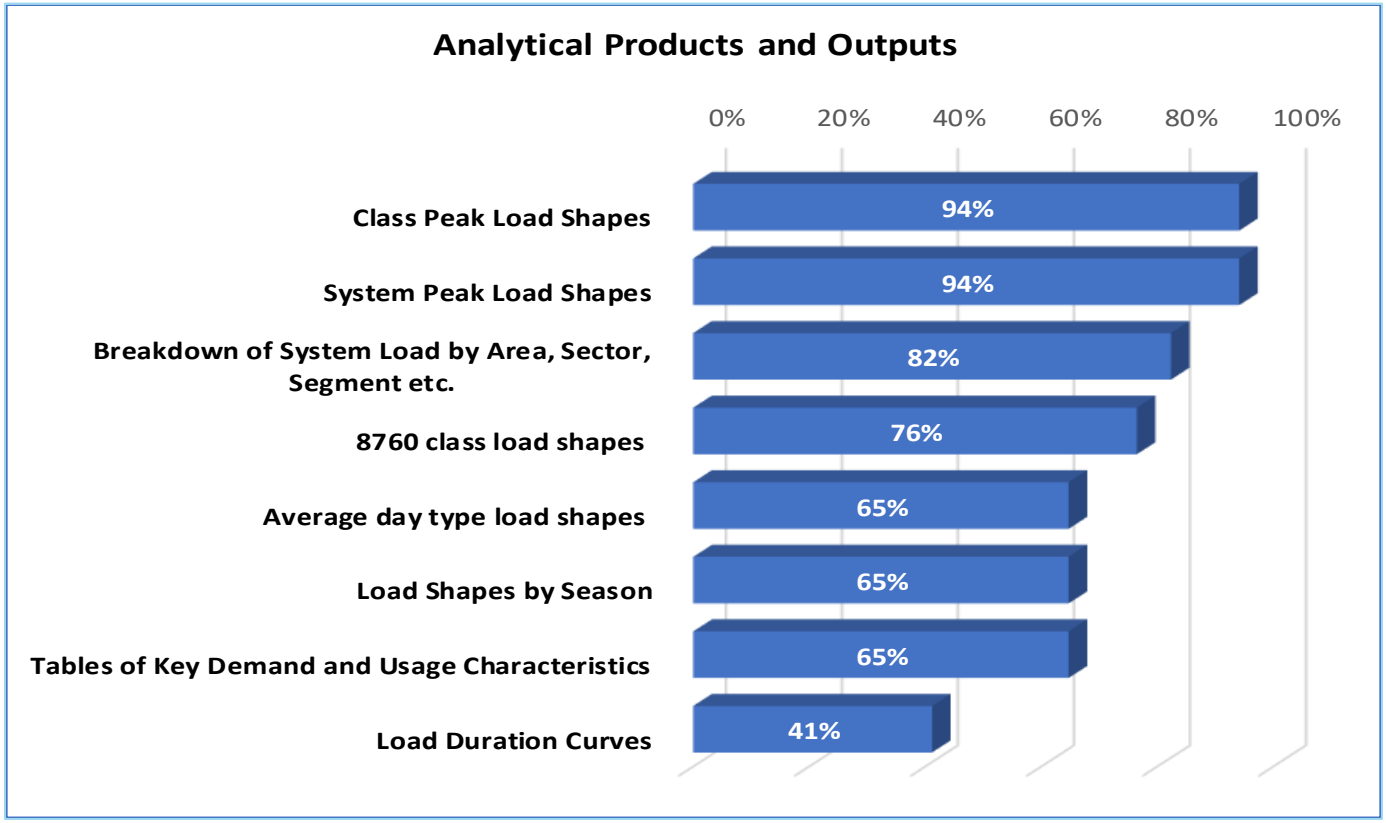

Representative load shapes and descriptive graphs and tables remain key output

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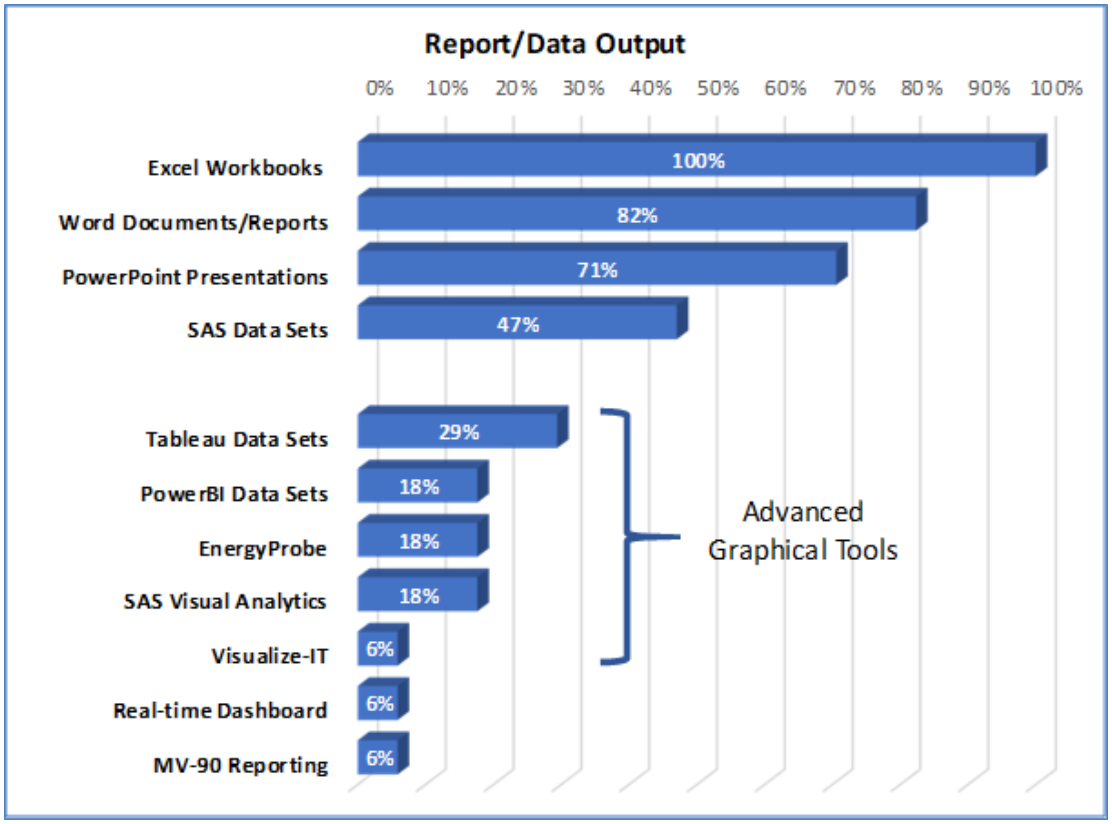

Most users of load research output want results in user friendly format.

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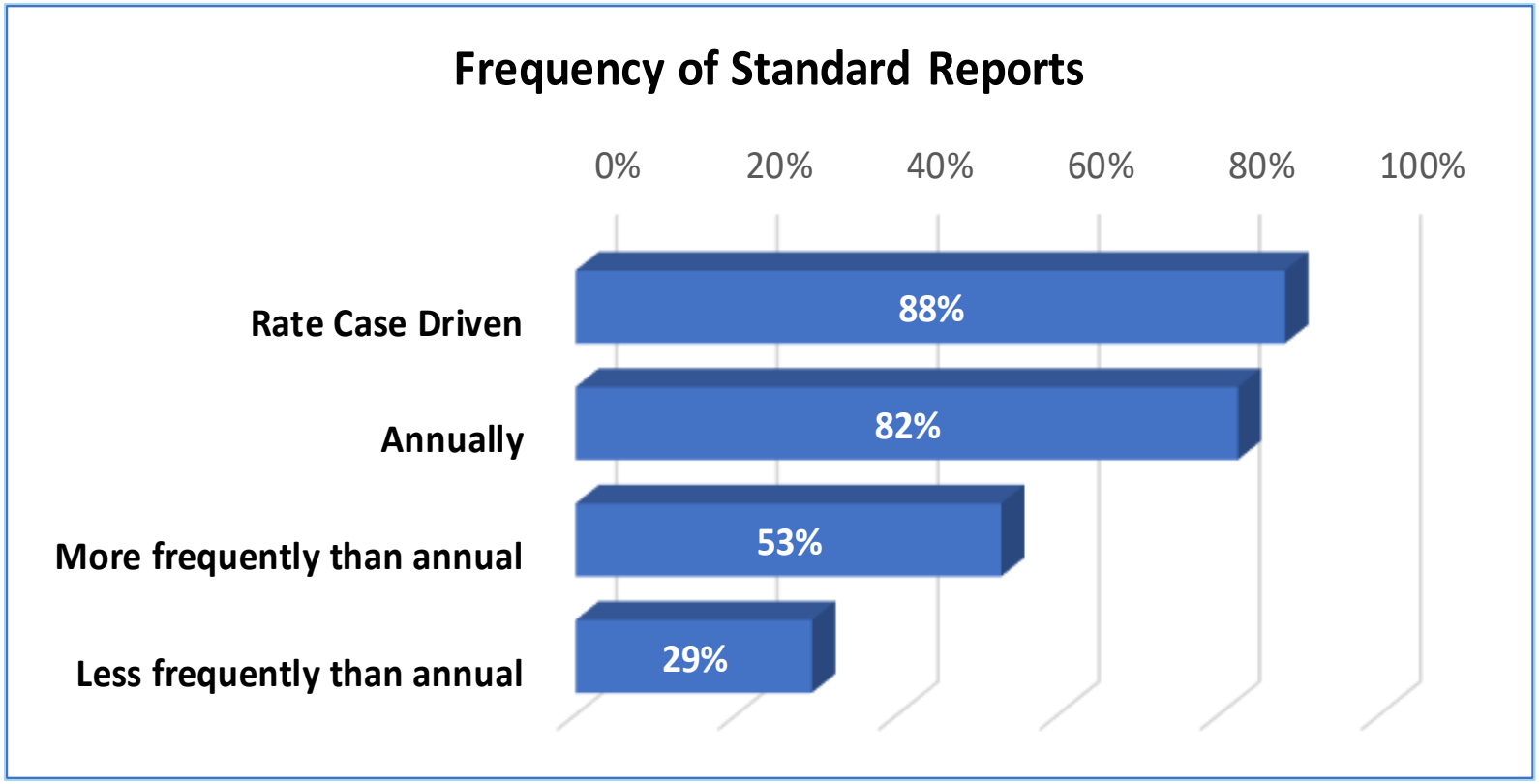

Most standard reporting driven by regulator process

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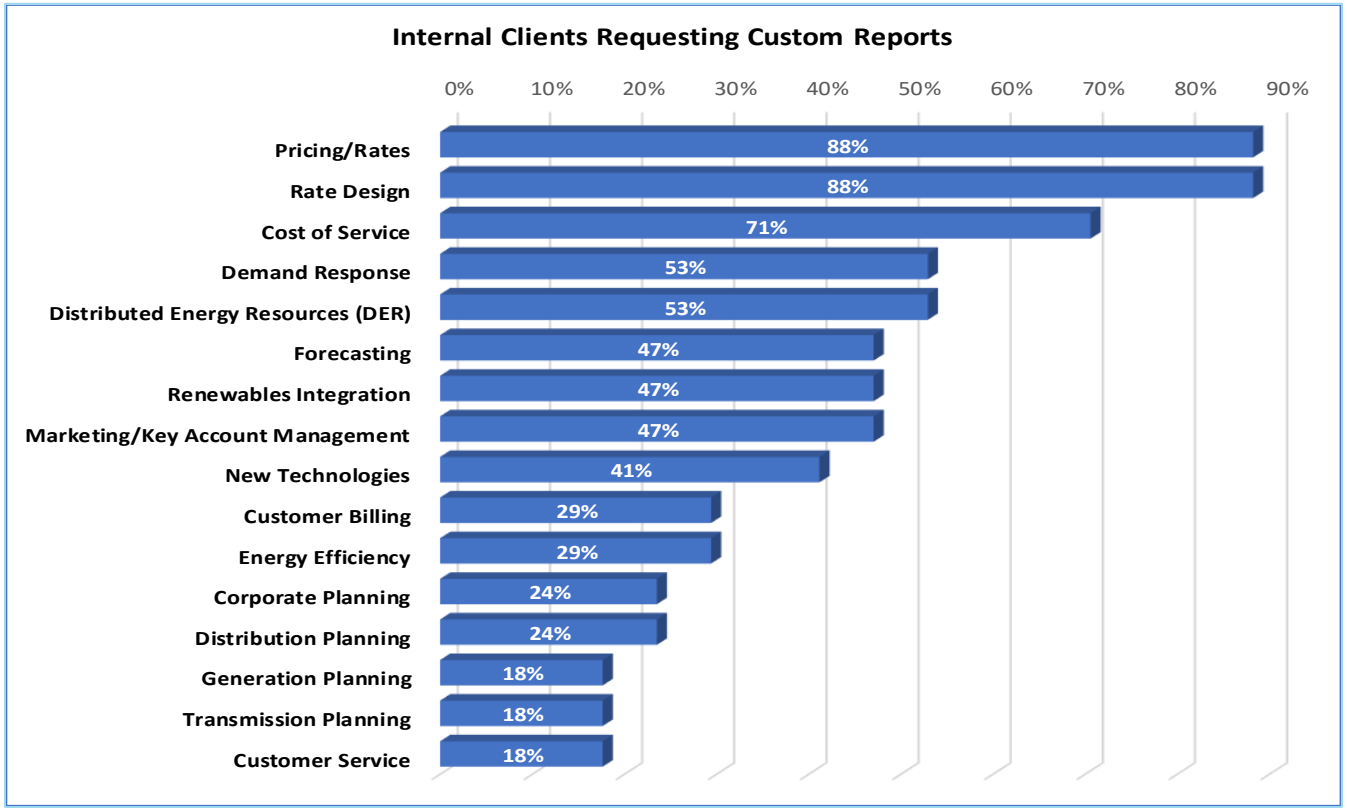

List of clients looking for load research analytical skills and output on the rise as more data is available and the distribution systems are changing due to DER and PEVs

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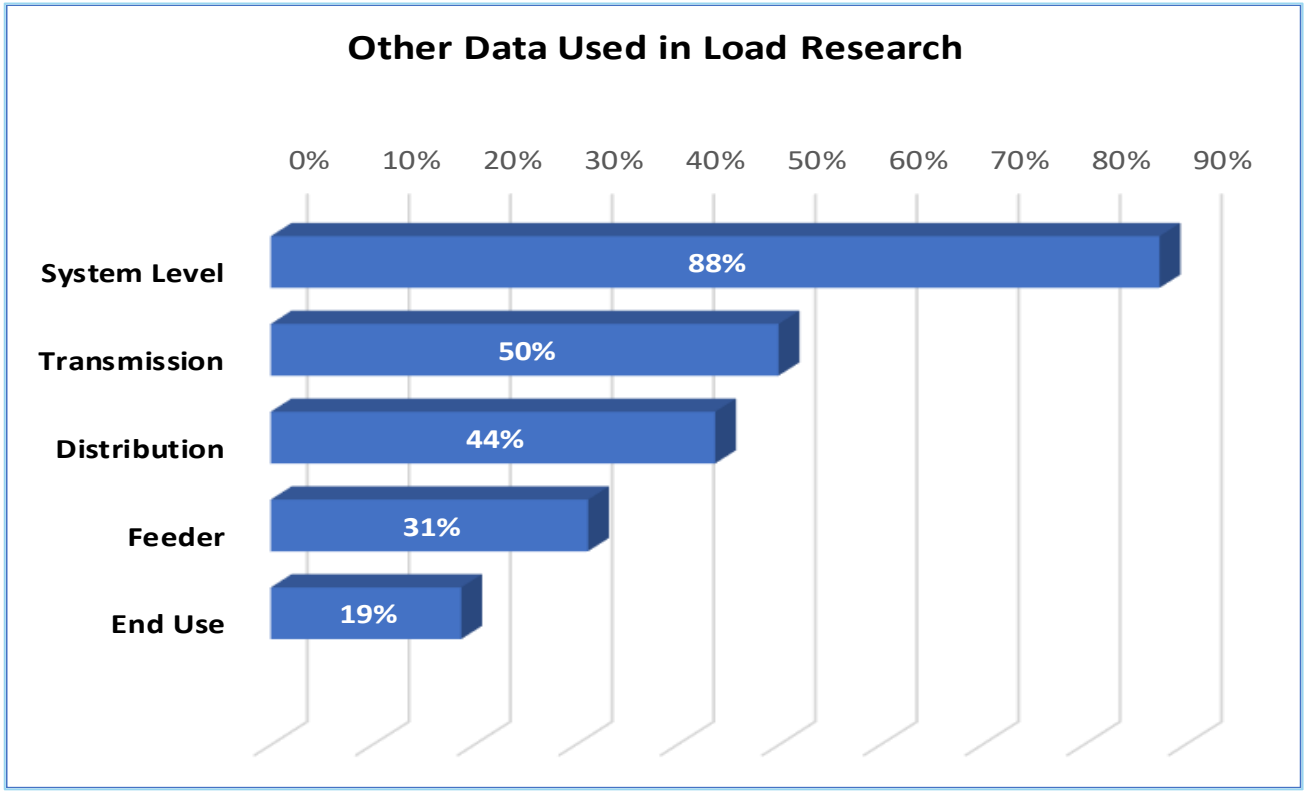

System load remains key in calibration of results, but new sensor data at the transmission, distribution, and feeder level now being incorporated in results. Cost of end use metering is coming down.

Global Best Practices: Summary of Results

1. Survey → 2. Selection Criteria → 3. Long to Short List → 4. Interviews → **5. Results (Report)**

1 Data Access

- All utilities had **direct access to individual customer data**
- All utilities, except for one, had **direct access to interval data**

2 Data Governance

- Load research engages with data governance helping ensure the validation, editing and estimation rules implemented by the data owner to provide high quality data that meets their needs

3 Internal Clients

- Load research internal clients were many
- Cost of Service, Pricing/Rates, and Rate design were identified by nearly all survey respondents

4 Reporting

- Standard reporting by the load research teams tended to be rate case driven or on an annual basis
- Over half of the survey respondents indicated that standard reporting was on a more frequent basis than annual

5 Staffing and Budgeting

- The average staff size associated with the load research function was four (4)
- A (BA/BS) degree was a minimum requirement with a desired focus on statistics and/or computer languages

6 Current / Future Analytics

- Scope of the LR is expanding, 88% of respondents indicated that the function has changed in the last 2 years
- AMI has played a major role making many more analytical activities possible while presenting new challenges

7 Improved automation

- Most of the utilities indicated that they can get immediate access to the population billing information and the interval load information

Questions ?

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