

Kevin Carden | Director, Astrapé Consulting, LLC

3000 Riverchase Galleria, Suite 575
 Hoover, AL 35244
 (205) 988-4404
 kcarden@Astrapé.com

With a background in production cost simulations for risk analysis and reliability planning for power supply options, coupled with twenty years of diverse utility management experience, Mr. Carden possesses the technical background needed to successfully execute a wide range of resource adequacy studies. Under Kevin's leadership, Astrapé Consulting has provided consulting services to utilities nation-wide including the Southern Company, TVA, SCE, EON-US, PGE, SMUD, APS, CLECO, and LCRA. For the Southern Company, he led the redevelopment of SERVM, an industry leading Resource Planning tool which is currently managed and licensed by Astrapé. Additional responsibilities have included project financial analysis, RFP independent evaluation, target reserve margin studies, renewable capacity valuation, demand side management program development and contract management for many large capital projects. Kevin holds a B.S. in Industrial Engineering from the University of Alabama.

Experience

- Modeling and design for assessment of power supply options
- Intensive power modeling experience in multiple applications, including software design
- Developed proprietary generation reliability and dispatch model for electric utilities
- Demand forecasting, demand-side option management, and optimal reserve margin targets
- Evaluation, procurement, and administration of long term power purchase contracts
- Demand-side options pricing and evaluation
- Bid preparation for power purchase RFPs
- Managing Director, Astrapé Consulting, LLC
- Generation Reliability Manager, Southern Company Services
- Holds U.S. patent in Generation Reliability Modeling techniques (#7698233)

Major Clients

Southern California Edison	Portland General Electric Company	Southern Company Services
Georgia Power Company	SMUD	PPL
LCRA	Tennessee Valley Authority	Arizona Power Service
Santee Cooper	ERCOT	CPUC
MISO	Terna	Malaysia
Pacific Gas & Electric	Publics Service Company of New Mexico	

Industry Specialization

Contract Management	Electric Market Analysis	Reliability Planning
Demand Forecasting	New Generation Development	Resource Planning
Dispatch Modeling	Project Financial Analysis	Risk Assessment and Mitigation

Education

B.S. Industrial Engineering, The University of Alabama

Relevant Experience

▶ Redevelopment of SERVM

Company Name: Southern Company Services - Resource Planning.

Mr. Carden has been responsible for the redevelopment, management, and use of a proprietary dispatch model used by the Southern Company for over two decades. This model is used primarily for reliability risk analysis and provides key insights into the value and need of capacity in both the short-term and long term. Kevin identified the need for the development of market modeling algorithms, new hydro logic, updated transmission modeling, economic dispatch criteria, reliability dispatch rules, and other key factors which contribute to reliability risks. Kevin wrote the majority of the logic for these additions based on his extended experience in resource planning. Using the model to run studies for the Southern Company, Kevin has recommended risk mitigation strategies that balance the cost of new capacity with the reliability benefits of those resources.

▶ Resource Adequacy Assessments

Southern Company Services: Maintain SERVM for Southern Company and assist in all resource adequacy studies. All reserve margin studies have been filed with regulators. Performed Production Costs and LOLE Based Reserve Margin Study in 2007, 2010, 2013; Performed Interruptible Contract evaluation; Performed Various Other Resource Adequacy Assessments and Product Cost Studies.

Tennessee Valley Authority: Performed Various Reliability Planning Studies including Optimal Reserve Margin Analysis, Capacity Benefit Margin Analysis, and Demand Side Resource Evaluations using the Strategic Energy and Risk Valuation Model (SERVM) which is Astrapé Consulting's proprietary reliability planning software. Recommended a new planning target reserve margin for the TVA system and assisted in structuring new demand side option programs in 2010. Performed Production Costs and Resource Adequacy Studies in 2009, 2011, 2013, and 2015.

PPL - Louisville Gas & Electric and Kentucky Utilities: Performed Reliability Studies including Reserve Margin Analysis for its Integrated Resource Planning Process. This study included the probabilistic simulations regarding load uncertainty, generator performance, and weather uncertainty. Planning Reserve Margin to Company based on lowest cost and risk to customers. Reserve margin study was filed with Kentucky State Commission.

CLECO: Performed resource adequacy studies for CLECO to determine optimal reserve margin and assist in other resource adequacy decisions. Performed Production Costs and LOLE Based Reserve Margin Studies. Performed 2016 Reserve Margin Study.

Pacific Gas and Electric (PG&E): Performing flexibility Requirement Study 2015 – 2017. CES Study for Renewable Integration and Flexibility 2015 – 2016.

California Energy Systems for the 21st Century Project: Performed 2016 Flexibility Metrics and Standards Project. Developed new flexibility metrics such as EUE flex and LOLE flex which represent LOLE occurring due to system flexibility constraints and not capacity constraints.

Testimony

Application of Cleco Power LLC Regarding the Costs and Benefits of Continued Participation in the Midcontinent Independent System Operator, Inc. Regional Transmission Organization, Docket No. U-_____, Direct Testimony on behalf of Cleco Power, LLC, June 19, 2017.

<https://lpscpubvalence.lpsc.louisiana.gov/portal/PSC/ViewFile?fileId=uVo6s1fRmdk%3d>

In re: Petition for a Certificate of Convenience and Necessity by Alabama Power Company, Docket No. 32953, Rebuttal Testimony on behalf of Alabama Power Company, January 27, 2020.

<https://www.pscpublicaccess.alabama.gov/pscpublicaccess/ViewFile.aspx?Id=1c997c6b-7e1d-40c0-b490-c488e26d9250>

Published Articles

National Association of Regulatory Utility Commissioners 2015, *A Study on Probabilistic Risk Assessment for Transmission and Other Resource Planning*, accessed 16, March 2021,

<https://pubs.naruc.org/pub.cfm?id=536DCE1C-2354-D714-5175-E568355752DD>