FINDING BALANCE

The Yin and Yang of Sustainable Energy Management

CALPINE ENERGY SOLUTIONS

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In ancient Chinese philosophy, yin and yang represent the concept of how seemingly opposing forces may actually be complementary. Generally, yin represents darkness / disorder while yang represents light / order with both elements constantly chasing one another.

The challenge of harmonizing opposing forces should be familiar to corporate energy managers. For years, they have been tasked with balancing the yin of fragmented market rules and extreme price volatility with the yang of disciplined governance and management practices. Best-in-class energy managers typically measure success by their ability to arrive at a targeted cost outcome **while also** staying within risk boundaries such as an acceptable budget variance range or cost-at-risk limits. They realize that achieving a cost goal without honoring the governance provided by risk boundaries is possible, but their success will not be sustainable from one year to the next.

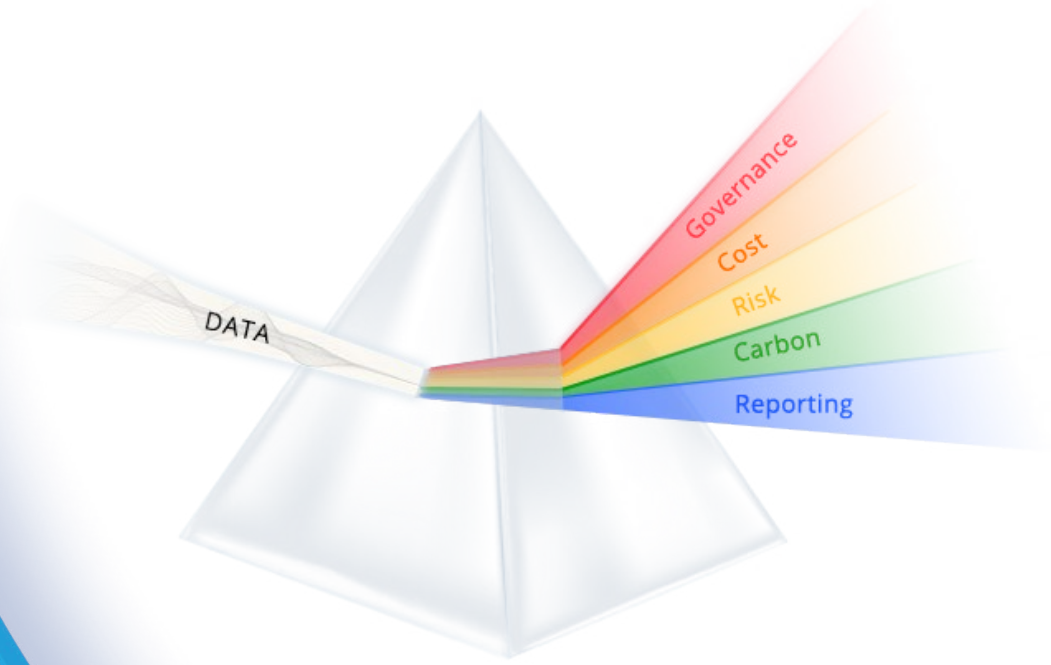
Integrating The New Variable: Carbon

Now that many corporations are pursuing Scope II GHG reduction goals, stakeholders must attend to a new variable in the equation - carbon. Admirably, many companies have entered into purchases of energy and / or the environmental attributes associated with specific renewable or carbon-free resources in efforts to attain their Scope II objectives. However, many seem to be doing so while breaking discipline from their risk management practices which is puzzling because renewable energy is energy; it has a cost, it has a range of risk outcomes, and it has a carbon attribute.

One possible reason for this break from discipline is that the roster of internal stakeholders has changed and not all companies have reconciled ownership responsibilities across departments for attainment of the Scope II goals. Corporate energy managers often reside within Procurement, Operations or Real Estate departments and have been primarily focused on serving the needs of the P&L owners. With the introduction of the carbon variable, we have a broader constituent base in the form of Sustainability, Treasury and Marketing Departments. Often times, decisions are being made in a vacuum, and what is commonly overlooked in the process is that the carbon reduction goal and the energy cost and risk goals are inextricably linked. Ultimately, it's critical for leadership to harmonize the goals and clarify the responsibilities of all internal stakeholder groups as to Scope II objectives.

Sensible Sustainability™

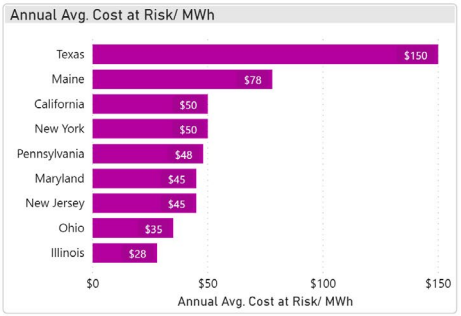
At Calpine Energy Solutions, we view renewable energy purchases as an important slice of the energy management portfolio. We employ a sustainable business process with our clients to enable data-driven decisions evaluated through a spectrum of five criteria: *governance*, *cost*, *risk*, *carbon* and *reporting*. We refer to the result of utilizing this prism as Sensible Sustainability™ because the decisions informed by it should be logical in relation to all five criteria.

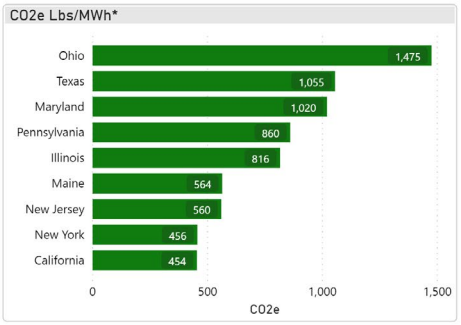


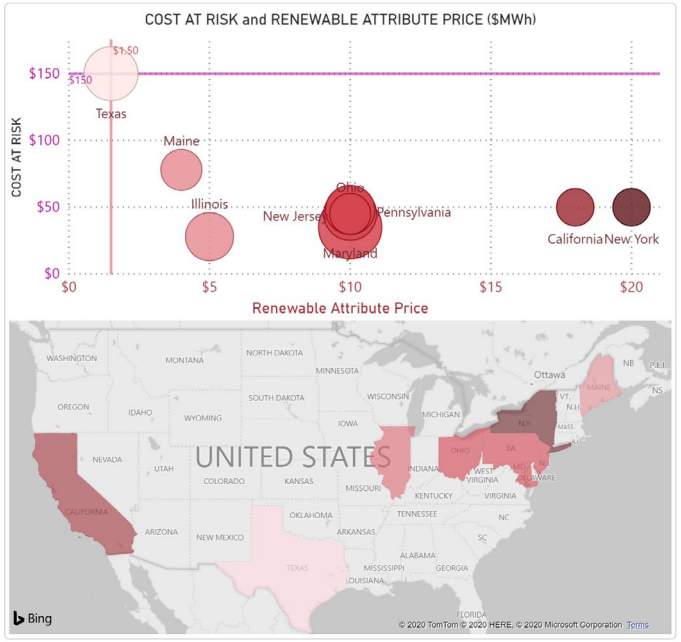
Calpine Energy Solutions has developed powerful analytical tools and data visualization platforms to support Sensible Sustainability™ , but the process starts with asking good questions because the answers help define the yang, or *governance*, that should be applied. We colorfully call our questions the "How Do You Knows": how do you know when to buy, how do you know how much to buy, how do you know how long to buy, and how do you know how well you performed? The introduction of renewable energy to consumer portfolios in simple terms, adds two additional questions to that list. How do you know where to buy and how do you know what to buy?

How Do You Know Where To Buy?

Determining where to buy starts with the understanding that all markets are going to present different nuances, challenges and opportunities. Specifically, each market is going to present a different intensity as to cost, risk and carbon. The charts below illuminate these three intensities and largely inform how we go about prioritizing where to buy.



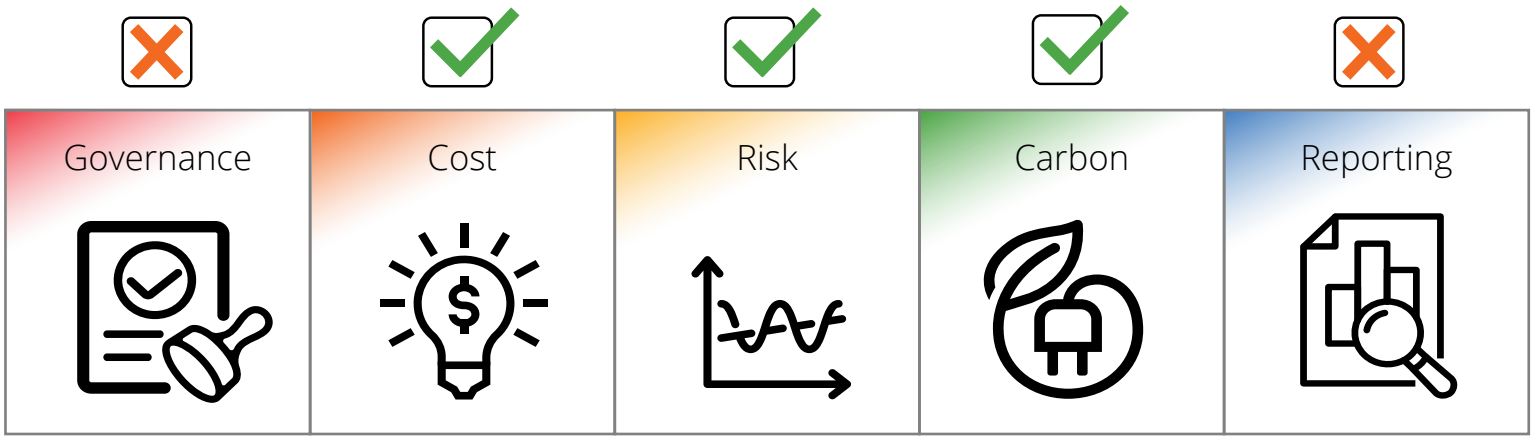




The Texas market (ERCOT) is by far the most volatile from a cost-at-risk perspective. Not only because of the $9,000 per MWh price cap, but also market realities that include a very constrained marginal capacity, rapidly increasing demand, extreme weather potential and a significant amount of intermittent resources primarily in the form of wind power. Next we can see where carbon intensity is greatest using the Environmental Protection Agency's eGRID factors, with Ohio producing the largest amount of carbon per MWh consumed, but with Texas not far behind. Finally, we examine the average cost of environmental attributes for the various markets with Texas being the least expensive and the northeastern markets and California having the highest price tags for environmental attributes. A quick scan of the data shows us that when prioritizing where to buy, all roads first lead to Texas because it provides the greatest reduction of risk and carbon at the lowest cost for the associated environmental attributes.

How Do You Know What To Buy?

To answer the "what" question, start by thinking about what you would like to say in your press release when announcing a renewable deal. Most corporate sustainability reports identify both a time-based, Scope II goal as well as the standard that will be used to report activities and results such as the "Location" or "Market" based standards defined in the GHG Protocol that was developed by the World Resources Institute. These standards represent another good lesson in the importance of making sure all internal constituents are represented and of yang working to harmonize yin. For example, if an energy manager unilaterally purchases Market-based environmental attributes from a resource that is **not** proximate to the company's carbon emitting locations, the *cost* and *risk* will likely be lower, making the Energy Manager happy. However, if the Location standard was chosen for *reporting* purposes, the NGO's will point out that while *carbon* was reduced, the standard was not met. In this case, the end-result was the attainment of only three of the five Sensible Sustainability™ criteria, making the Chief Sustainability Officer unhappy.



"How Do You Know What To Buy?" Continued

Deciding what to buy also requires consideration of the best fit pertinent to technology and delivery terms. For instance, imagine a large consumer who is provided two renewable offers from two different developers; one from a wind project and the other from a solar project. Both projects are located in Texas (ERCOT) and delivering power into the same zone which is also where the consumer has facilities, allowing for a Location-based claim under their reporting protocol. Both projects offer stated hourly quantities (MW's) as reflected in the tables below, at a fixed price for a nearly identical term and quantity that represents about one third of total expected consumption. If one were to simply evaluate the projects based on the *cost*, *carbon* and *reporting* the consumer likely would proceed solely with the wind project because the carbon reduction and reporting claims are the same, but the cost of the wind deal is $12 / MWh lower than the solar deal.

WIND GENERATION

	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
Jan	3.16	3.15	3.10	3.13	3.18	3.12	3.20	3.11	2.98	2.52	2.39	2.27	2.27	2.22	2.20	2.17	2.18	2.44	2.84	2.94	2.94	3.04	3.24	3.25
Feb	3.60	3.57	3.66	3.65	3.65	3.55	3.48	3.49	3.25	2.87	2.69	2.57	2.62	2.72	2.61	2.63	2.46	2.48	2.79	3.11	3.27	3.47	3.55	3.62
Mar	2.80	2.85	2.92	2.87	2.82	2.85	2.74	2.66	2.19	2.01	1.87	1.86	1.92	2.00	2.14	2.22	2.17	1.99	2.06	2.26	2.48	2.70	2.71	2.75
Apr	3.06	3.13	3.06	2.94	2.75	2.70	2.67	2.26	1.68	1.88	1.83	1.94	2.04	2.15	2.13	2.14	2.12	2.04	1.95	2.30	2.53	2.75	2.94	2.94
May	2.24	2.28	2.37	2.42	2.36	2.29	2.30	1.49	1.37	1.29	1.27	1.29	1.40	1.51	1.63	1.70	1.69	1.67	1.57	1.88	2.17	2.24	2.22	2.23
Jun	2.29	2.41	2.38	2.35	2.31	2.21	2.00	1.16	1.22	1.09	1.04	1.08	1.07	1.14	1.20	1.36	1.37	1.33	1.31	1.49	1.94	1.98	2.09	2.22
Jul	1.85	1.83	1.75	1.57	1.55	1.62	1.39	0.85	0.78	0.72	0.72	0.74	0.74	0.77	0.79	0.84	0.80	0.84	1.01	1.25	1.62	1.67	1.71	1.76
Aug	1.43	1.46	1.46	1.30	1.33	1.27	1.30	0.80	0.66	0.62	0.58	0.53	0.51	0.56	0.64	0.64	0.67	0.70	0.78	1.23	1.49	1.54	1.47	1.50
Sep	1.57	1.53	1.40	1.42	1.43	1.26	1.27	1.17	0.67	0.72	0.70	0.68	0.69	0.79	0.87	0.90	0.88	0.94	1.15	1.74	1.73	1.63	1.56	1.56
Oct	2.43	2.40	2.29	2.15	2.06	2.06	2.11	2.13	1.58	1.32	1.38	1.31	1.34	1.38	1.41	1.45	1.44	1.58	2.09	2.29	2.33	2.38	2.43	2.47
Nov	2.58	2.64	2.62	2.63	2.60	2.59	2.63	2.62	2.30	1.77	1.60	1.62	1.57	1.57	1.57	1.44	1.48	1.80	2.39	2.54	2.62	2.67	2.60	2.64
Dec	2.95	2.88	2.88	2.85	2.89	2.90	2.98	2.95	2.81	2.29	2.04	1.95	1.98	1.90	1.88	1.74	1.80	2.28	2.70	2.79	2.85	2.99	2.97	3.01

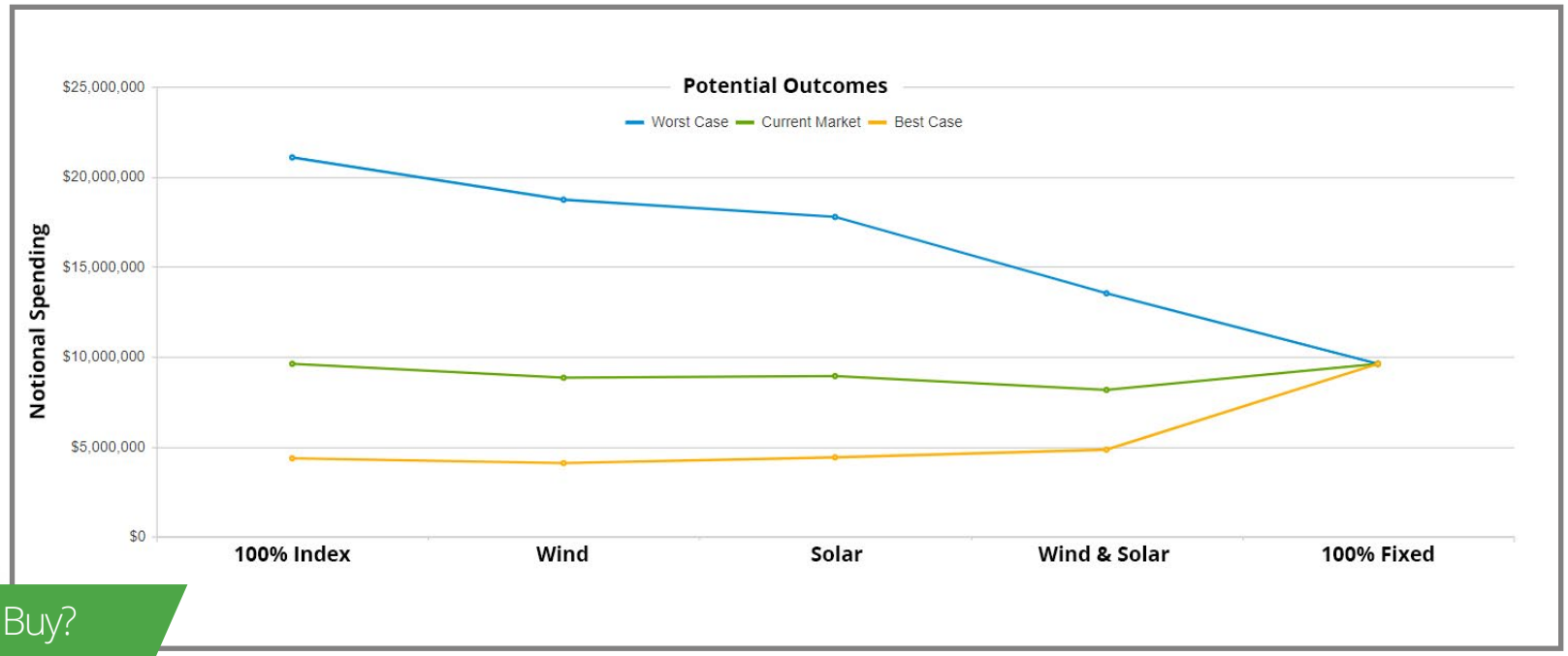
SOLAR GENERATION

	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM
Jan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	2.16	3.90	3.59	3.27	3.31	3.50	3.47	2.91	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	3.25	4.14	4.46	4.77	4.87	5.00	4.84	4.44	2.28	0.15	0.00	0.00	0.00	0.00	0.00	0.00
Mar	0.00	0.00	0.00	0.00	0.00	0.00	0.45	2.85	4.91	5.32	5.56	5.71	5.68	5.66	5.58	5.20	3.72	1.03	0.00	0.00	0.00	0.00	0.00	0.00
Apr	0.00	0.00	0.00	0.00	0.00	0.19	2.27	4.92	5.84	6.21	6.60	6.55	6.62	6.14	5.49	4.93	4.13	2.04	0.21	0.00	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00	0.00	1.06	3.82	5.40	6.00	6.01	5.92	6.24	6.06	5.86	5.88	5.24	4.43	3.30	0.99	0.00	0.00	0.00	0.00	0.00
Jun	0.00	0.00	0.00	0.00	0.00	1.18	3.48	4.87	5.85	6.51	6.43	6.44	6.38	6.28	6.14	5.60	4.61	3.45	1.36	0.04	0.00	0.00	0.00	0.00
Jul	0.00	0.00	0.00	0.00	0.00	0.77	3.02	4.95	5.66	6.36	6.78	6.91	6.69	6.52	6.16	5.67	4.83	3.42	1.18	0.01	0.00	0.00	0.00	0.00
Aug	0.00	0.00	0.00	0.00	0.00	0.26	2.36	4.81	5.74	6.29	6.47	6.37	5.89	5.75	5.68	5.20	4.44	2.69	0.48	0.00	0.00	0.00	0.00	0.00
Sep	0.00	0.00	0.00	0.00	0.00	0.00	1.27	4.08	5.26	5.58	5.69	5.62	5.39	5.22	4.96	4.66	3.69	1.07	0.00	0.00	0.00	0.00	0.00	0.00
Oct	0.00	0.00	0.00	0.00	0.00	0.00	0.30	2.55	4.59	4.54	4.57	4.67	4.59	4.38	4.16	3.72	1.53	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Nov	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	2.86	3.47	3.60	3.56	3.49	3.28	3.26	2.04	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	1.82	3.12	2.92	2.83	2.77	2.68	2.70	1.40	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Wind Generation	88,476 MWh	$18.00/MWh
Solar Generation	89,084MWh	$30.00/MWh

“How Do You Know What To Buy?” Continued

However, probability analysis indicates that the solar project would destroy considerably more *risk* than the wind project because it delivers far more power during the most volatile, peak hours of the day. The three middle cases shown in the Potential Outcomes chart below quantify the risk mitigation associated with each in relation to a 100% index, grid power scenario on the far left and a 100% fixed, grid power scenario on the far right. Ultimately, this hypothetical consumer should strongly consider proceeding with both projects. This would allow them to secure an average cost in the mid $20’s / MWh and significantly contribute to their carbon reduction goals, **while also** honoring their *governance* guidelines by further constraining their price risk.



Balance Requires Discipline

Managing a data-driven, corporate energy program that assesses all aspects of the spectrum: governance, cost, risk, carbon and reporting is critical and requires tremendous discipline. The yin stemming from competitive cost pressures, energy price volatility and damage to our environment must be balanced in a comprehensive and complementary manner. Deploying Sensible Sustainability TM solutions means attaining your specific goals **while also** honoring the boundaries agreed upon by all stakeholders which has the added benefit of making these decisions more defensible in retrospect. More than ever, it's critical that you work with a partner who can bring transparency and order to the process by helping you answer the "How Do You Know" questions with experts who have powerful analytical tools that can identify and quantify risks and perform scenario analysis to allow you to consider your best options in consideration of all aspects of the spectrum.

To learn more about attaining Scope II GHG reduction goals while also staying within established risk parameters, give us a call today at **1-877-273-6772** and press option **2**, or email us at energysales@calpinesolutions.com