

Piloting through peak time

Vincent Thomas, P. Eng, Rodan Energy Solutions, offers some ideas on how oil and gas facilities can more effectively manage electricity costs.

One of the largest operational concerns facing oil and gas production facilities is the high cost of electricity. Improved management of these costs is possible by understanding new dynamics in the electricity market. The most effective tools in effectively managing energy costs are the use of peak tracking software, monetisation of distributed energy resources (DERs), bill verification, and intelligently optimising all energy assets.

Peak tracking software

Most facility managers already know that North America's electricity markets have placed a financial premium on energy use during times of highest electricity demand to manage supply and demand. However, electricity peak demands are continually shifting and getting harder to predict accurately. Factors such as extreme weather and surges in electricity use can change the timing of electricity peak demand. In response, businesses are often reducing power consumption for longer hours and sometimes shutting down production entirely. The pressure and stress of balancing business operations and escalating energy costs is a challenge.

Rodan Energy has developed power system peak tracking and notification tools that help oil and gas companies substantially reduce electricity costs, while minimising impact on operations. Downtime is obviously costly. Peak tracking software is designed to maximise uptime by reducing the times

when it recommends reducing, or 'curtailing', energy use during peaks. Advanced peak tracking software that employs machine learning, weather data, and proprietary data sets is more accurate at identifying peaks than using published ISO and utility demand forecasts alone.

The most advanced peak management solutions provide three forecasts to provide an enhanced level of energy intelligence. The three forecasts include the following:

- ISO forecasts.
- Utility forecasts.
- Proprietary forecasts.

Reputable peak tracking software is now often a cloud-based solution hosted on secure servers that help reduce the possibility of local problems or interruptions. The best forecasts are based on demand forecasts and combine this with optimised machine learning algorithms to analyse consumer behaviour during peak events and study patterns, learning from every new data point. The result is a system that is continuously taking the experience from today to make better predictions tomorrow.

Peak tracking software can also provide windows of time during which the user can either avoid peak electricity pricing or opt to curtail their loads for extended periods to earn Demand Response (DR) revenue. The software example shown in Figure 1 identifies three probability windows during a qualified

curtailment day, which provides options to operations managers:

- 2-hour aggressive window (red bar).
- 3-hour moderate window (yellow bar).
- 4+ hour conservative window (green bar).

Curtailling based on the conservative strategy (largest window) maximises savings and ensures compliance with any mandatory DR programmes. For businesses that prioritise maximising their operational uptime, the aggressive strategy (narrowest window of 2 hours) provides for DR participation while ensuring production goals are achieved.

DER optimisation and monetisation

DERs are electricity-generating assets placed near the consumers of power (i.e. distributed). Often a part of a critical backup power plan or a microgrid initiative, a DER asset connects to a local distribution system or within a host facility. 'Behind-the-meter' power systems can generate significant economic value to the host facility by reducing peak demand charges, helping them weather spikes in power costs and enabling participation in energy arbitrage by selling the power they generate back into the grid. The potential for generating revenue depends on the DER asset type and its operating schedule.

There are various types of DER generation assets: solar, wind, geothermal, combined heat and power, energy storage, or natural gas.

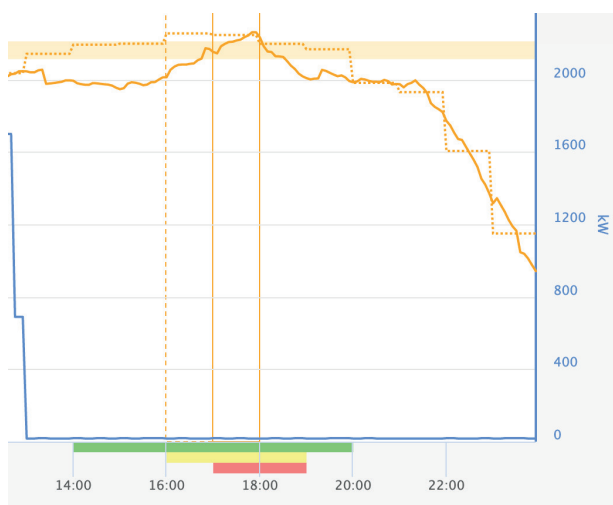


Figure 1. Predictive peak tracking software.

Table 1. Facility demand snapshot		
Actual facility demand (kW)	Typical facility demand (kW) ³	Estimated curtailment (kW)
2483	5477	2994
2400	4953	2553
2436	5105	2669
3025	5251	2226
2502	5388	2885
2569	5235	2666
12 846	26 174	13 329

Distributed energy resources can also help large energy consumers manage their peak electricity and demand charges described earlier in this article. Using their own DER during windows of peak demand allows facilities to continue using some, if not all, of their operational load, while avoiding the highest peak demand charges. Overall, DERs can generate increased savings, improve power reliability, and enhance the resiliency of an oil and gas facility.

Asset optimisation

Businesses in the oil and gas sector using battery and energy storage systems (BESS) often rely solely on one revenue stream, such as avoiding high electricity costs. However, this limits a business to only a static revenue model. By employing a well-thought-out asset optimisation strategy, a facility can fully utilise its energy storage to participate in energy arbitrage, demand charge reduction and ISO, or utility ancillary service programmes.

Businesses receive the added benefit of seeing their energy storage system's performance under real-load conditions, which provides confidence in the system's ability to perform during backup power emergencies. An energy storage system's full earning potential can be realised when used to support contractual requirements (such as DR) and helping facilities earn additional revenue on the electricity market. Programmes include the following:

- Real-time energy markets.
- Capacity market products such as Operating Reserve (OR) and ancillary services.

Finding the right mix of revenue streams is critical to maximising return on investment. It is important to continuously monitor and re-evaluate the local energy market to ensure new energy storage revenue-generating opportunities are not missed.

Asset owners and facility managers often contract third-party energy service providers to manage their energy storage system by optimising the charging during periods of lowest electricity prices and selling back to the grid when rates are highest. Advanced peak tracking software, described earlier, can also help facilities seek these other revenue streams, generating revenues outside of energy peak periods. A peak tracker provides both peak forecasting and market forecasting, helping facilities with energy storage and/or DERs to choose the best option.

Having access to the right software is crucial to get the most from an energy storage system. A peak tracker can maximise performance by knowing when the highest demand and highest energy prices will occur, allowing facilities to optimise the usage of their energy storage in real-time.

Other energy savings strategies can also have a significant impact on energy consumption. When utilised in conjunction with peak tracking software, these strategies can provide for multiple savings and revenue streams. Energy services companies specialise in the implementation and monetisation of DERs. When installed, these assets can be monetised in the form of energy arbitrage, load-displacement for DR, peak shaving, demand charge reduction, and many other programmes. Combined, this

represents a significant value add solution that supports low cost, fast payback installations.

There are many processes to manage while executing a DER solution that often falls outside the expertise of facility operators. Partnering with a capable energy services provider that can combine DER asset management expertise with proven peak tracking experience is an effective one-stop approach taken by many oil and gas businesses.

Energy advisors and engineers oversee all aspects of a project, including monetisation plans that often include central government and local government incentives, energy arbitrage, peak shaving, and elimination of demand charges. Solutions can consist of renewable energy and energy storage, in conjunction with natural gas or co-generation (e.g. CHP) peaker plants.

Case study

A multinational oil and gas company operating in Alberta, Canada, invested in a peak tracking software service. During their first month, the company shed approximately 10 MW of load during a demand peak, saving the company CAN\$100 000 in its first month. This production facility has 23 MW of load at peak times due to operational dependencies but was still able to save CAN\$321 855 in six months.

Every MW counts; reducing only 1 MW of load can create CAN\$10 000 in savings per month. Companies with

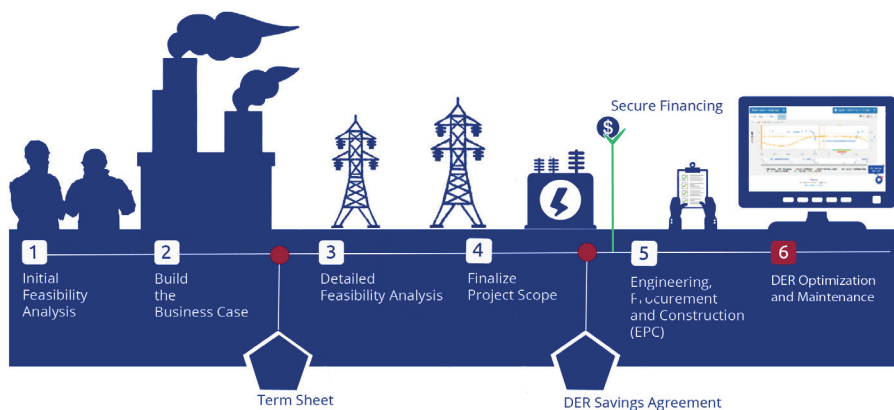


Figure 3. DER project timeline.

the ability to reduce 10 MW of load during a peak can accumulate approximately CAN\$1.2 million of savings per year.

The company also deployed Rodan’s Powertracker bill verification software and found significant savings from overbilling of demand charges by utilities.

Conclusion

There are many ways to reduce energy consumption and generate savings without negatively impacting operational profiles. Identifying the right mix of generating assets, aligning with the right monetisation programmes, and leveraging the best energy intelligence for peak tracking are the key to sustained success. Selecting a trusted energy advisor that employs modern tracking and analytics tools is an essential step in maximising savings and revenue-generating potential. 