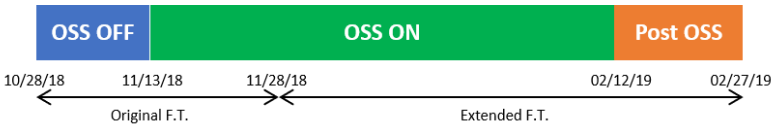
CASE STUDY

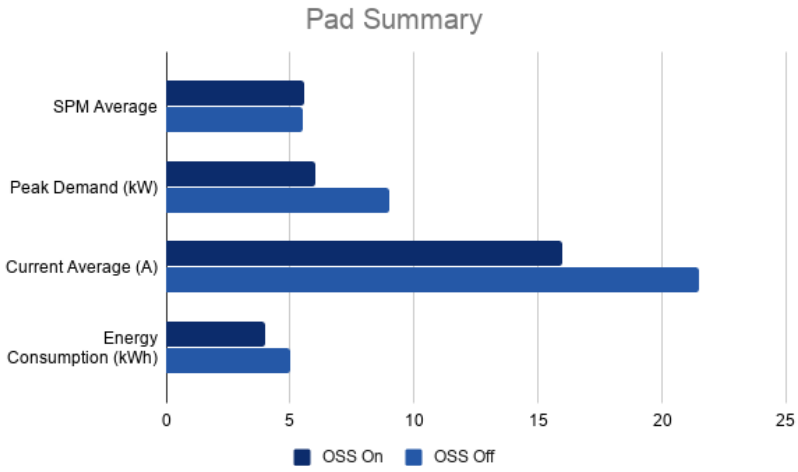
POWER SENTRY® | On Site Storage

A major US oil producer chose to install one Power Sentry On-Site Storage ("OSS") system and four utility grade meters at the Bakken Alpha Centauri 21-1 pad in North Dakota. Prior to installation, a baseline power consumption was established. Power readings were captured for the week of October 28th, until switching the OSS system on, November 13th, 2018. The original pilot was scheduled for two weeks. However the decision was made to extend through to February 12th, 2019 in order to record a more comprehensive data set.

Results Summary

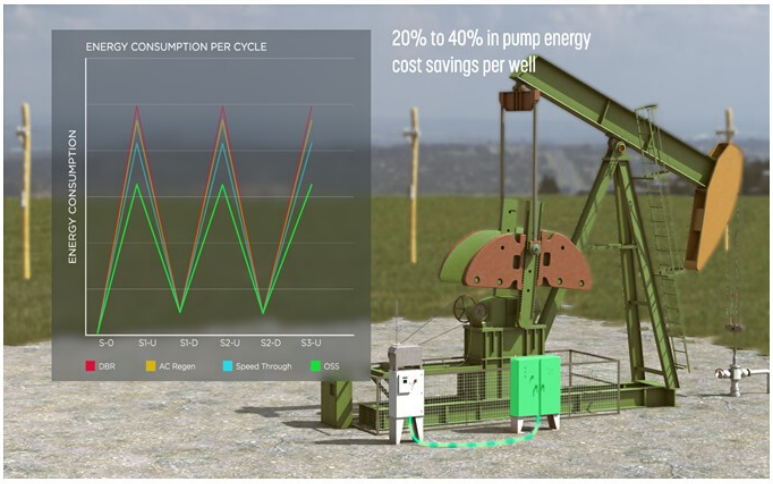
- Overall improvement across all four wells of **19%** in kWh consumption.
- Peak Demand reduced by **34%** when using OSS module. Demand value used by utilities in calculating monthly charges is calculated by factoring the highest Demand (DMD) Watt Total metered every 15 minutes.
- Data was collected on the Accuvim II-R energy meter and summarized by performing a comparison between comparable Strokes Per Minute (SPM) and amperage values for the pre- and post- OSS periods.





How does OSS work?

The Power Sentry OSS system utilizes capacitor-based storage technology to capture and reuse the regen energy of pump jack and rod lift systems to reduce kWh usage and peak demand, typically reducing power consumption requirements from utilities by greater than 20%.



OSS versus Current Methods

- Today, regen energy is burned off as heat through the braking resistor. This is wasteful and inefficient.
- AC regen drives will convert regen energy to useable power for sale back to the grid. This option is expensive and the savings are negligible.
- Speed through will use the wasted energy but mechanical failure is inevitable.

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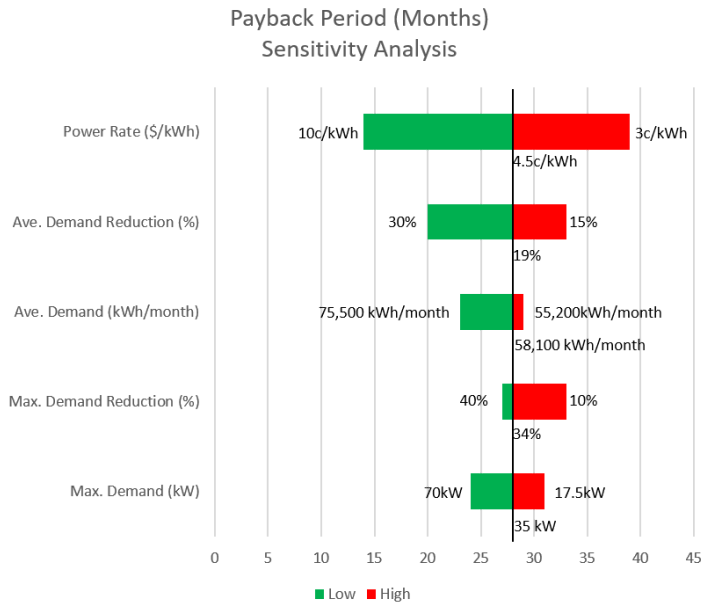
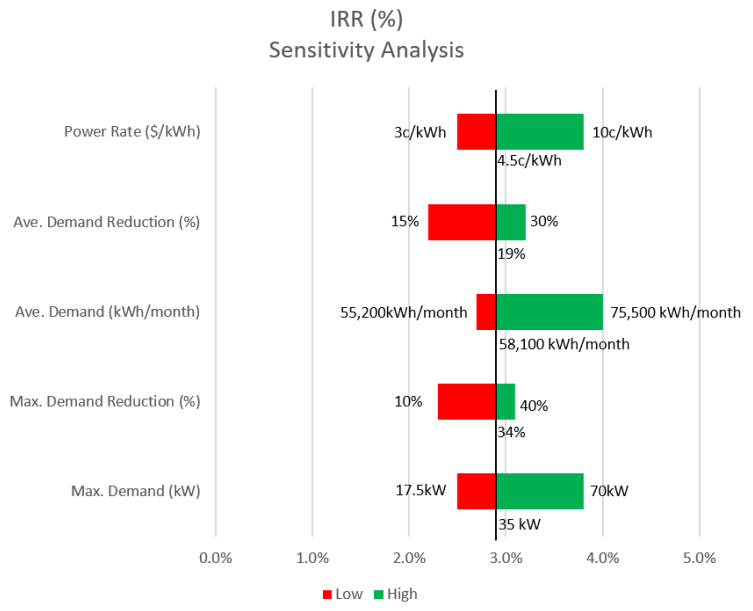
Cost/Benefit Sensitivities





Highlights

Field trial succeeded in evaluating performance of the technology

- Validated easy installation process
- Equipment performed with high levels of reliability (no unplanned equipment shut-down)
- Technology achieved results within quoted range:
  - Average kWh Demand Savings 19% met expectation
  - Peak Demand Saving of 34% significantly exceeded expectations

Economic application of the technology is heavily dependent on:

- Power rates charged by the Utility Company
  - At rates below ~8¢ (total kW + kWh), business case will be difficult to justify however in areas where this rate is above 10¢, financial justification will be a lot more robust
- Overall Power Consumption of the Quad Pad
  - New well-pads with balanced wells will see less of an impact when applying this technology
  - In older well pads more prone to having unbalanced rod pumps and higher lifting costs, this technology would yield significant financial benefits

Economics

Description	Unit	Base Case (w/o Solar Add-on)	Include. 30% Federal Tax Credit (with Solar Add-on)
Max. Demand	kW	35	35
Max. Demand	$	$379	$379
Max. Demand Reduction	%	34%	36%
Max. Demand Reduction	$	$129	$137
Ave. Demand (Quad Pad)	kWh/month	58089	58089
Ave. Demand (Quad Pad)	$/month	$2,614	$2,614
Ave. Demand Reduction (Quad Pad)	%	19%	21%
Ave. Demand Reduction (Quad Pad)	$/month	$497	$549
Average Power Cost (Quad Pad) w/o OSS	**$/month**	**$2,993**	**$2,993**
Average Power Cost (Quad Pad) w/ OSS	**$/month**	**$2,368**	**$2,308**
Average Power Savings (Quad Pad) w OSS	**$/month**	**$626**	**$686**
Power Sentry System Cost	$	$22,108	$17,361
Power Sentry Installation	$	$810	$810
Equipment Freight	$	$1,200	$1,200
Payback Period	Months	39	28
IRR (in 5 yrs)	%	1.6%	2.9%

28 month payback period based on Alpha Centauri 21-1 pad metrics

2.9% IRR

Savings of ~$10,000 on this pad with an annual oil production of 98,000 BBL gives 10¢/BBL reduction in lifting cost. On a better suited well pad this could go up to about 30¢/BBL

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