Oil pumping using low energy pumps and solar power in the United States

Subject	Oil pumping	**Location**	Texas, United States
Application	Oil extraction from five remote wells with remote monitoring	**Implementation**	Project designed and installed by Texas Secondary Oil Corporation
Size	Designed for 55 barrels per day at 850 ft	**Installation**	March 2016

The Aztec Wilson K lease is located west of Devine, TX. This area is very rural with very little infrastructure in place.

Texas Secondary Oil Corporation saw an opportunity to drill five new wells on this lease.

An assessment was made of the costs for getting the five wells drilled and operating.

The costs were obtained for running in power lines and obtaining easements to the proposed five wells. With a quoted of USD 46,000 for delivering power the project almost stopped there.

The solution was to do something different, Texas Secondary installed LORENTZ low energy oil pumps.

The pumps are so efficient that they are able to be powered from solar panels, removing the need to install expensive power infrastructure while also avoiding installation of hard standings and investment in pump jacks.

The result of the project is efficient, clean, silent oil pumping using renewable power with savings on both capital investment and operating costs.

Project

Drilling and equipping five new wells on the Aztec Willson K lease with two challenges.

Firstly because of the remote rural location no power was available on site. The costs for installing power lines and

Secondly each well was estimated to produce five barrels per day so the costs of the project needed to be kept to a reasonable level to secure a good return.

Texas Secondary took on the challenge to look for alternative solutions.

A decision was made to install LORENTZ submersible progressive cavity pumps. The decision was made based on:

- Low power DC brushless motors used by the pump allow for the pumps to be run on solar power, avoiding the need to install expensive power infrastructure
- Lower capital cost and cost of install than a traditional pump jack
- Ongoing service work is reduced, no broken rods, pulling pumps for regular cleaning or replacement of wear and tear items.

Due to the remote location and low operational cost expectations the systems were designed to be fully remotely managed.

Technical Solution

Each pump system operates independently pumping fluid to a central tank battery.

LORENTZ PS1800 Energy pumps are used to pump the fluid from each well. Each pump is powered by 4x 190Wp solar modules. The solar modules run the pumps during daylight hours. There are no batteries in the system as this would introduce significant cost and inefficiency to the system. Before installation a simulation was done using the LORENTZ COMPASS software to see exactly how much fluid would be extracted month on month.

Each pump system has a PS Communicator device installed. This is a standalone, solar powered communication unit which provides a real-time communication link between the pump and the cloud based pumpMANAGER application. pumpMANAGER allows all pumps to be monitored and managed from any internet connected device through a web browser interface. This means that the client did not need to have an IT infrastructure investment to use these advanced services.

Each system is also equipped with a liquid level sensor down the well. The level sensor measures the level of the fluid in each well and both records and reports this figure back to the pumpMANAGER application via the cellular network. The web based application allows users to log on and see the running status of each pump with data such as Run time, volume pumped, rotation speed, motor current and any event that may need action, i.e. tank full or well level source low. The level of fluid can be clearly seen in real-time and the pump speed or pumping interval can be remotely changed to maximize production. This feature greatly reduces the need for costly on-site visits.

Texas secondary are looking at adding a localized pressure switch in each line close to the well head so should the tank be full or valves are closed, the pressure switch auto detects the pressure build up and shuts down the pump. A "tank full" warning would be shown locally on the controller and also sent via the communication system and displayed on the pumpMANAGER portal.

LORENTZ Energy pumps for oil pumping

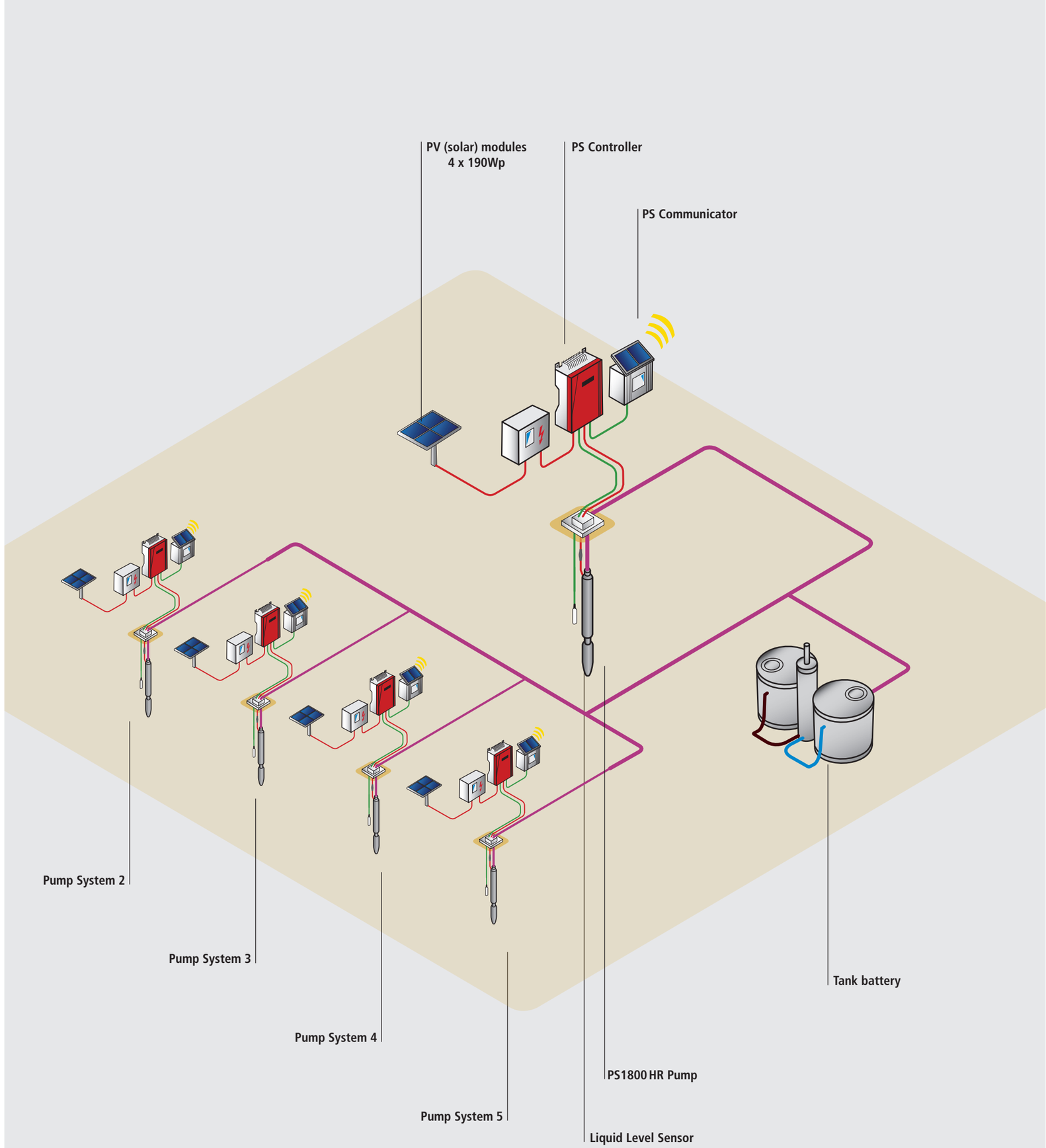
LORENTZ have been designing and manufacturing solar powered water pumps for over 20 years. These water pumps are used in the most extreme environments on earth and being solar powered are designed with highest efficiency in mind.

LORENTZ Oil pumps are specialized products which use some of the design elements which have made LORENTZ water pumps so successful but then have been adapted for use in harsh chemical and high liquid temperature conditions. LORENTZ Energy family of pumps also include solutions for the oil and gas industry where they have a long proven record of reliability and improving operating cost efficiency.

Low energy progressive cavity pumps

The low energy progressive cavity design is currently suitable fro lifts up to 2,300 ft.This pump has has three main benefits.

- Low power consumption. In the oil application then a typical pump would pump 1.9 barrels per hour with a head of 1,500 ft using only 680 W of power.
- Low power means that there are choices for the power supply. The pumps can be powered from the grid with single or three phase power or can be powered directly from solar panels
- The helical rotor mechanism is a positive displacement pump, by design and operation the pump end is self-cleaning. It uses only solid stainless steel rotors and chemical tolerant synthetic rubber for a long and service free life.



Performance monitoring and production optimization

All LORENTZ pump systems are equipped with on board data logging and management tools. Using the Pumpscanner Android™ App live data can be viewed over a local Bluetooth connection. Data is stored for up to ten years. Other settings such as speed and timers can also be set with a few clicks on the intuitive smartphone app.

The pump controller also has inputs for additional flow and pressure monitoring. Using in built specialized software, levels in the well can be measured and stored. The speed of the pump, timers or even on/off interval running can easily be set depending on the data received. This allows production to be optimized without using expensive additional monitoring equipment or spending time on trial and error methods.

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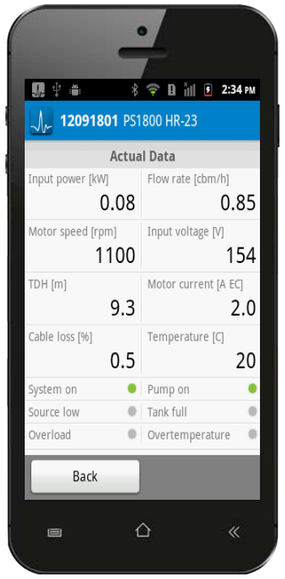
LORENTZ PumpScanner

PumpScanner is an Android™ App that allows you to monitor and manage your LORENTZ pumps from a Smartphone or Tablet. This exciting development for the LORENTZ pump systems is a clear differentiator from the competitor offerings. It allows easy setup of the pump system and improves identifying performance issues and pro-active service work to a great extent. Compliance, maintenance and fault finding time and costs therefore are reduced significantly.



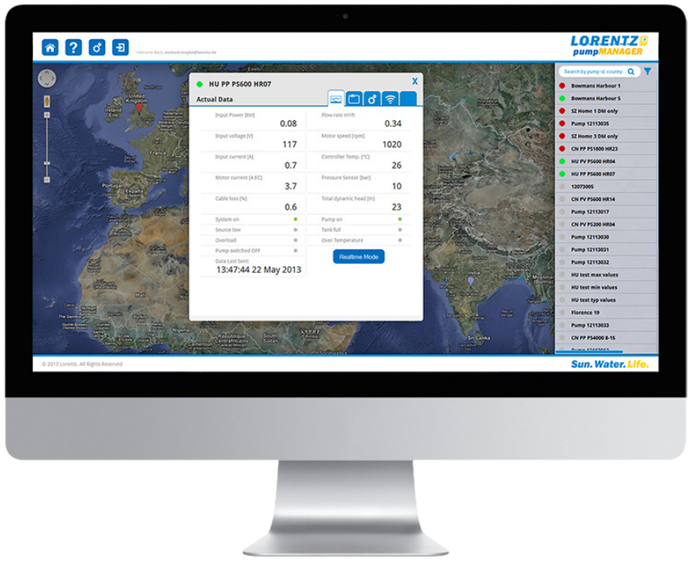
LORENTZ pumpMANAGER

pumpMANAGER is a cloud based management, monitoring and control platform for LORENTZ pump systems.

pumpMANAGER provides:

- Recording of voltages, current, flow rates, pump speed, temperature and pressures of monitored pumps
- Liquid-level measurement
- Real time and historical data views
- Remote configuration and programing of pump systems
- Proactive alerts via email in the event of a system problem

With a LORENTZ pump system and pumpMANAGER you can monitor and manage your pump from anywhere online.



Results

The system is fully operational. The pumps are pumping the amount of fluid that was planned and the oil production is above the expectation that Texas Secondary had.

The site is quiet, clean and has required no maintenance since the pumps were installed.

Texas Secondary is now looking at introducing the LORENTZ Energy Pumps on other sites.

What customers are saying about LORENTZ Energy Pumps

"When we were looking at alternative solutions to traditional pump jacks we thought that the LORENTZ pumps were interesting. The ability to use solar power was what interested us initially but what we did not predict was how valuable the real-time system and fluid level data was. This combined with the ability to adjust the pump speed an runtime interval really allows us to maximise the fluid from the formation." - Birch Dowman - Texas Secondary

"Progressive cavity pumps (PCPs) have been long regarded in the oil industry as a good and reliable solution. Unfortunately these have only been available for larger wells and at very high costs. With this submersible DC brushless motor and the PCP this is a really efficient and robust technology for the stripper well market" - Birch Dowman - Texas Secondary

"Being able to monitor the site remotely and understand the fluid levels and fluid pumped is invaluable. I can see that we will greatly reduce the need to visit the site, we can even look at how much fluid is pumped and plan when we go to empty the tank battery. Everything we have here helps us to reduce production costs and maximise profits even with very low commodity prices." - Walker McCullough - Texas Secondary

"The LORENTZ Energy Pumps actually allow us to reconsider opening up some dormant wells where we had either power problems, marginal profitability or technical challenges." - Birch Dowman - Texas Secondary

"Sometimes siting a pump jack next to a residential area does cause some added costs, neighbor disputes and we obviously take the safety of local residents seriously. With the silent, unobtrusive solar pumps some of these sites become much easier for us to manage." - Walker McCullough - Texas Secondary

Texas Secondary Oil Corporation

ABOUT Texas Secondary

Texas Secondary has specialized in the shallow oil industry (above 2,000 ft) in South Texas since its founding in 1970. Operating in excess of 400 wells itself, Texas Secondary provides economical oil field services to third parties ranging from building locations through drilling, cementing and completion. The company will often take working interest in it customer's wells or leases for all or part of its billing. Check out our services!

Let us work with you!

Having no investors itself, Texas Secondary can act as an industry partner or invisible operator on a cash or services basis to investor oriented companies. We are very much working interest oriented and have cash available for participation..

ABOUT LORENTZ

LORENTZ is a market leader in solar powered water pumping solutions.

Founded in Germany during 1993 LORENTZ has pioneered, innovated and excelled in the engineering and manufacturing of solar powered water pumping.

Today LORENTZ is active in over 120 countries through a dedicated network of professional partners. LORENTZ technology uses the power of the sun to pump water, sustaining and enhancing the life of millions of people, their livestock and crops.

Simply – *Sun. Water. Life.*

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