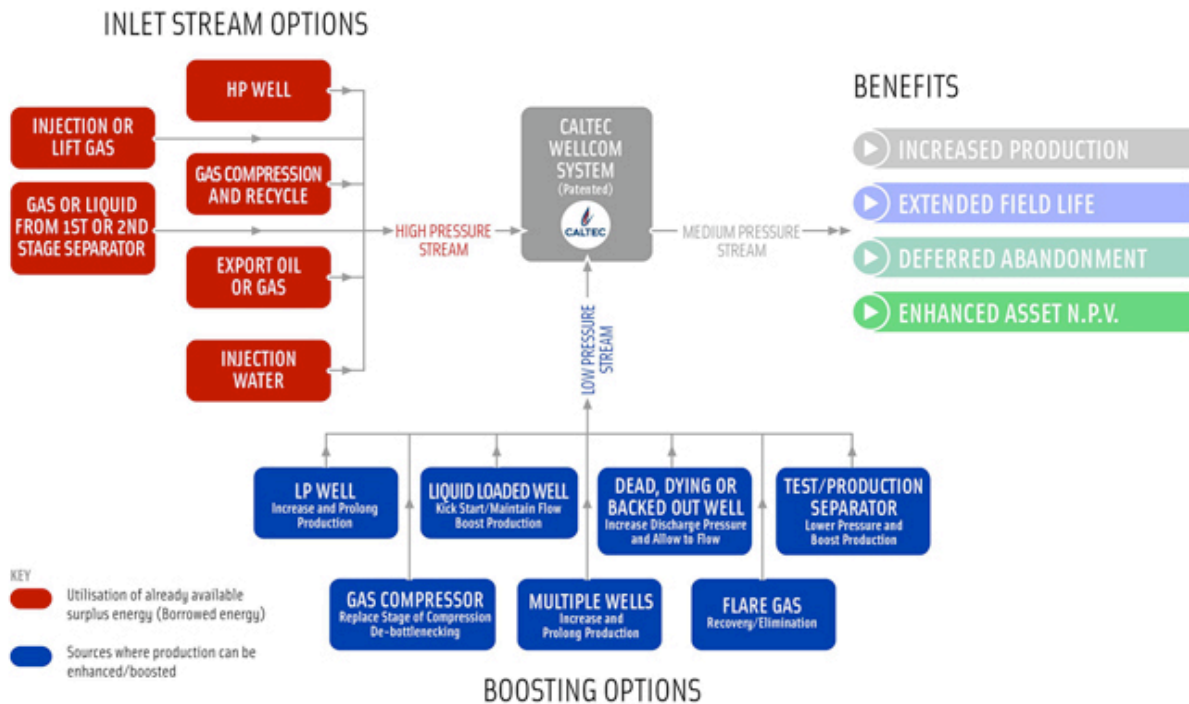


Caltec information guide for Production Boosting

Caltec specialise in technology that uses available or wasted energy to boost or enhance production and prolong field life. The following guide should be read in conjunction with our questionnaire, which is a means to allow us to understand, which installations and wells, may offer the best opportunities initially, to generate additional revenue for the operator and its partners.



STEP 1 – Finding a suitable motive source – using wasted or available energy on the platform

There are many available or wasted sources of surplus energy on platforms or installations that Caltec technology can make use of. These include:

Gas Source: We can borrow a small portion of gas from any of the following sources to boost production on gas or multi-phase wells:

- Recycled or a side stream of compression gas
- Gas wells (existing or future)
- Separated gas from the 1st or 2nd stage separator
- Export gas
- Injection or lift gas

Liquid Source – We can also use liquid to boost multi-phase wells and gas wells:

- Multiphase wells (existing or future)
- Injection pump (oil export stream or equivalent)
- Water injection pump
- Temporary liquid pump to generate the HP motive flow
- Export pipeline liquids

STEP 2 – The LP wells

There are many ways in which the motive source can be used to increase production and prolong field the following are a few examples of what is possible;

- Lower the back pressure and/or increase the discharge pressure of an LP well
- Kick start or clean up dead, liquid loaded or dying wells
- Make use of an HP well that is typically choked back to increase production of an LP well
- Use an HP well that would have backed out the LP wells as a means of allowing the LP wells to continue to produce
- Eradicate flaring – returning the LP gas to production for resale or to be used as fuel gas
- Replace 3rd or 4th stage compression trains and or eliminate the need to re-wheel them
- Reducing the operating pressure of a separator to reduce back pressure on multiple wells
- Supply of a compact test separator with integral jet pump (Caltec's Patented Wellcom system). This can operate in tandem with the existing test separator to provide enhanced well testing capabilities, stand alone boosting or well clean up facility for any of the wells.

Productivity Index

Caltec can only determine the production increases for individual or multiple wells if we are provided with the production characteristics. This is typically know as the productivity index.

STEP 3 the required discharge pressure

This is the minimum pressure required to allow the LP wells to discharge in to the downstream process system or overcome the process constraints. This would typically be the minimum pressure your wells need to flow at to reach the process facilities or installation.

Other Information

The most important aspect we require; are the pressure and flow rates of any available motive source, the pressure and flow rates of your nominated LP wells and your required discharge pressure. A basic P&ID of your overall process and wells would also assist greatly.

It is important to note that the boosting system does not necessarily have to be located close to the LP wells or on satellite platforms. There are options which involve installing the boosting system on the main platform, gathering station or indeed on the separators (including test) to lower the separator pressure whilst still discharging at the required (higher) discharge pressure. This system can then reduce the back pressure on the line coming from the satellite platform or wells. It is also important to evaluate the impact of introducing motive flow to the pressure of the export line or if injection water is used, its impact on downstream process system.

Caltec Screening

Caltec can assist in the screening of assets for suitable applications, if required in order to determine which ones will give you the best production benefits. This process would involve one of engineers visiting your offices to review the following data:-

- Well data
- Process P & ID's and ISO's
- Current operating and design pressures of process equipment and pipelines
- Details of any process / production constraints or bottlenecks
- Access to process an wells engineers to answer any questions