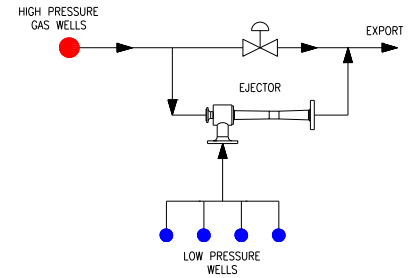


**1. Increase Recovery from LP Wells:**

A high pressure gas well can be used to enhance both the production and the total recovery from a depleted well using a multiphase ejector. The installation of an ejector on the surface allows one to use free energy from a high pressure well to boost a low pressure well, thereby obtaining enhancement of the well production and/or extension of the field life. This device does not require any power supply and is characterized by a simple design, absence of moving parts and small dimensions, coupled with a high degree of reliability and low cost.

- Decreasing the pressure of HP gas to a suitable lower pressure to meet downstream condition
- Bringing back the LP wells to life



**Case study [1]:**

Gas-gas ejectors data for some fields are presented at the following table. According to the experience gained, an ejector can be now designed, manufactured and installed with a total capex not greater than U.S. \$170,000 and an average payout time of less than 2 months.

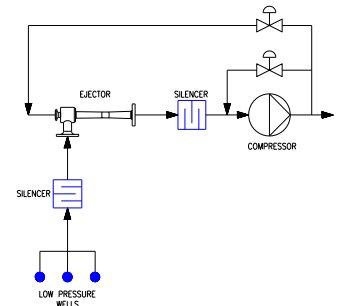
**Table 1. Gas-gas ejectors data for some fields [1]**

Installation	Start-Up	Cost (U.S. \$)	Production Increase (S.m <sup>3</sup> /d)	Payout Time (Months)
<b>Spilamberto 16 Well</b>	9/2/95	100,000	21.000	1,5
<b>Spilamberto Gas Plant</b>	21/11/95	103,000	25.000	1,4
<b>Dosso degli Angeli Field</b>	14/2/96	77,000	30.000	1
<b>Fratello platform</b>	2/8/96	70,000	12.000	2
<b>Garibaldi A platform</b>	Early 1997	133,000	50.000	1
<b>Amelia C platform</b>	Early 1997	173,000	30.000	2
<b>Total</b>		<b>656,000</b>	<b>168.000</b>	<b>.Avg. 1,3</b>

**2. Boost Production By Means of Adding Ejector to the Old Compressor:**

In case of older production facilities in which the design points have changed, compressors are less efficient. Discharge gas of compressors fed back into it to maintain the efficiency, while this energy can be used as the motive of ejectors and the advantages of adding ejectors are as following:

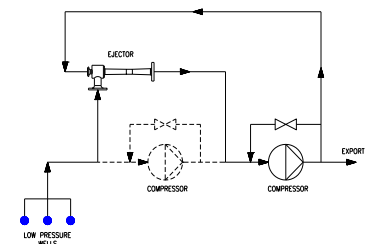
- Reducing the back pressure on LP wells
- Using of otherwise wasted energy
- Boosting production



**3. Ejector Instead of 1<sup>st</sup> Stage Compressor:**

As ejectors do not have any moving parts, they are maintenance free and do not need to any electrical power; they can be totally used instead of 1st stage mechanical compressors in LP wells discharge. High pressure gas of 2nd compressor can be used as motive of ejector. The advantages are as below:

- Eliminating the need for 1st stage compressor
- Reducing the capital costs



**Case Study [2]:**

A well was limited to 600 MCF/d with 9 psig wellhead pressure by the 2-stage reciprocating compressor installed. The compressor had plenty of horsepower to move more gas but the piping and cylinder configuration did not allow lower pressures. Replacing the 300 hp compressor with a different machine would be very expensive so an ejector was added between the wellhead and the compressor to compress the full stream—basically adding a compression stage. This ejector lowered the wellhead pressure to -5 psig

with 9 psig discharge pressure (atmospheric pressure at this site is 11 psia so the ejector developed 3.3 compression ratios) and increased the well's production to 900 MCF/d. The efficiency of the ejector is only 46 percent, but it reduced the capital outlay required by more than an order of magnitude.

**References:**

[1] "Ejectors for Boosting Low-Pressure Oil Wells", SPE Prod. & Facilities 14 (4), November 1999, Marco Villa, SPE, Giambattista De Ghetto, SPE, Francesco Paone, SPE, ENI Agip, and Giancarlo Giacchetta, and Maurizio Bevilacqua, U. of Ancona

[2] "Gas Well Deliquification", second edition, Gulf professional publishing, James F. Lea, Henry V. Nickens , Mike R. Wells