**Challenge**
Improve stimulation effectiveness in a formation historically stimulated with limited fracture conductivity and low polymer recovery.

**Solution**
Use HiWAY* channel fracturing technique to create stable flow channels, and increase fluid and polymer recovery.

**Results**
- Realized 32% higher initial production.
- Increased 6-month cumulative gas production by 19%.
- Reduced operational footprint
- Eliminated proppant flowback and screenout issues.

**PEMEX wanted to optimize hydraulic fracturing in tight gas formation**
The Eocene Yegua formation in the Palmito field is a tight gas, low-permeability formation composed of multiple sandstone and shale layers. To achieve commercial production rates, PEMEX must typically complete these vertical and S-shaped wells in one to three stages and apply hydraulic fracturing treatments to each stage.

However, many of these wells have had proppant flowback issues, limited polymer recovery, and low fracture conductivity. To counter this, PEMEX has tried reducing polymer loading, applying higher-quality proppants and polymers, and using encapsulated breakers.

**PEMEX selected HiWAY service to improve well performance**
Schlumberger recommended applying the HiWAY flow-channel hydraulic fracturing service to increase effective fracture half-length and conductivity, and reduce screenout and proppant flowback issues. After a comprehensive assessment—which included a mechanical earth model study, petrophysical characterization, and hydraulic fracturing simulation—PEMEX determined that the channel-fracturing technique had the potential to deliver better production results. PEMEX decided to pilot the HiWAY service in six strategically placed wells.

**Comparison of conventional fracture treatments to HiWAY flow-channel fracturing treatments using normalized production rates. HiWAY wells showed 32% higher initial production than offset wells.**
CASE STUDY: PEMEX increases gas production 32% while reducing operational footprint

Schlumberger performed fracturing treatments and thorough well comparisons
The completion team performed the HiWAY service by alternating pulses of 20/40 sand and non-delayed borate crosslinked gel at rates up to 26 bbl/min. Fibers were added to aid the proppant in forming stable flow channels within the fractures. After stimulation, the wells were flowed back through various well testing equipment and choke sizes. This allowed PEMEX to gather accurate readings of hydrocarbon production and frac fluid recovery rates—and rigorously compare the channel fracturing technique to conventional methods.

PEMEX increased production and polymer recovery, reduced footprint and screenouts
After 6 months, PEMEX obtained 32% higher initial normalized production and 19% higher normalized production than offset wells. Channel fracturing enabled PEMEX to use smaller proppant mesh sizes—20/40 mesh instead of 16/30 mesh—and use less proppant per stage than wells treated with conventional stimulation technology. One HiWAY pilot well averaged 38% polymer recovery—more than double previous amounts. In addition, zero screenouts or proppant flowback issues occurred during the six-well campaign. The success of the field trial prompted PEMEX to apply the technology in similar fields throughout Mexico.

Average normalized production over 6 months. HiWAY treatments provided 19% higher production than conventional hydraulic fracturing treatments.

www.slb.com/HiWAY