

17 Ways to Engineer Your Way Out of a Downturn



1. Introduction

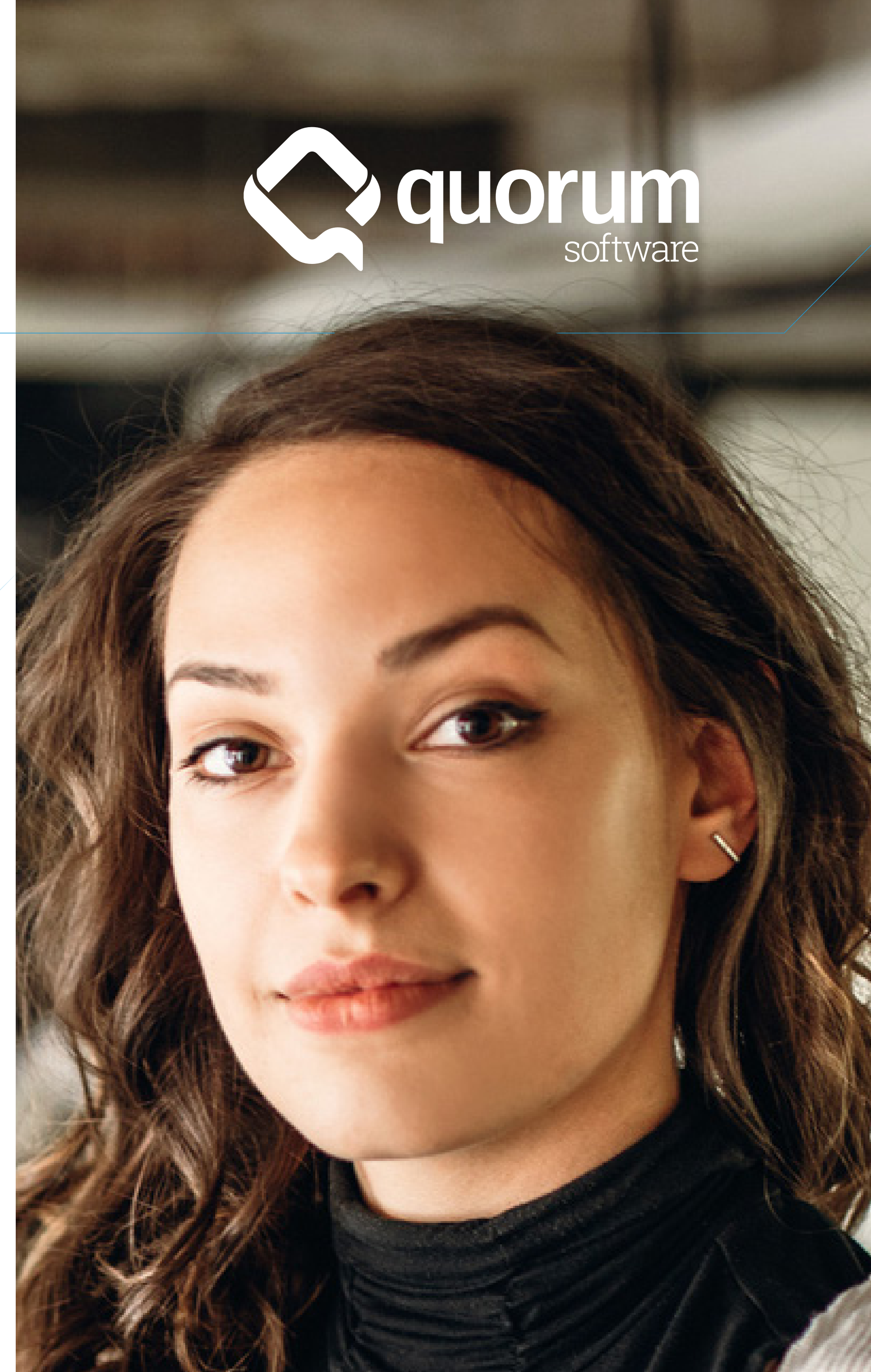
It's always a good time to boost your production and increase your cash flow – but never more so than right now. In the face of volatile market conditions, it's essential that oil and gas companies balance their production growth and increase efficiency to reduce costs to ensure profitable returns.

Producers can improve the performance and profitability of their ongoing operations through a combination of increasing existing production, reducing operating costs, and improving their forecasting. The following is a list of things that companies – through their reservoir engineers – can do right now, without an increase in capital spending, to survive the energy downturn.

Reservoir Engineers are in the best position to drive capital efficiency.

2. Increase Production

Often the first instinct when faced with market uncertainties is for producers to confront the thing they have most control over: costs. And while lowering operating costs is an important part of the process, the truth is that the amount that a producer can save in cutting costs is not enough to sustain profitability on its own. It's crucial that operational savings be combined with increased production from existing wells, which can be accomplished the following ways:





Downtime Analysis

Identify wells with persistent downtime and assess the value of downtime reduction for each well. Prioritize your effort by ranking the opportunities in terms of increased first year cash flow. Often, downtime improvement may be as simple as having a remote sensor on a well with scheduled callout staff or installing a plunger lift on gas wells. But until you perform an accurate downtime analysis, you won't know where to start in terms of improvements.

Increase Voidage Replacement

In a water flood, the liquid production should increase during fill-up and then remain constant while the voidage replacement ratio is one. Decreasing liquid rate and/or increasing gas oil ratio are indicators that the voidage replacement ratio is less than one. This will result in reduced production rate.

The opportunity is to increase the injection volume, to increase rate, or reallocate available water to patterns with the greatest oil productivity when sufficient water is not available.

We teach that the reservoir pressure should remain at or below the bubble point to keep oil viscosity from increasing.

In fact, it is possible for dramatic increase in pressure with little incremental injection if the pressure rises above the bubble point. The rate increase due to pressure can be greater than the loss due to viscosity.

Increase Drawdown

This opportunity relates to high water cut heavy oil pools on primary production. Use a stacked oil/water production graph to look for wells with a constant or falling liquid rate. Mobility ratios for heavy oil usually indicate that liquid rate will increase with recovery (increasing water saturation). This diagnostic will lead to shooting a fluid level to confirm the potential to increase drawdown and production rate.

Field Compression

Use gas material balance to identify the potential reserve gain and value from lowering the abandonment pressure. For compressors running below capacity, investigate the potential to reduce inlet pressure by reconfiguring cylinders. Assess the short-term value of renting an additional compression stage to reduce inlet pressure.

Artificial Lift

Implement a program of regular fluid level shots and IPR curves to determine potential oil production increase and the scheduling of artificial lift. Monitor casing pressure to detect when plunger lift may be effective and continuously monitor the plunger settings to optimize production.

3. Reduce Operating Costs

Water Handling

Pay attention to the cost of handling water by having it as a separate variable cost in your lease operating statements and as a separate line item in your economic and reserve evaluations.

Normal practice is to include water as a variable cost for the primary product, resulting in a cost decrease as production declines when, in fact, it will result in a cost increase.

For gas wells, water may be your greatest cost because you usually truck it away from the lease. Look for a low cost disposal opportunity near the wells. Forecast the water production to know when plunger lift may be required.

For oil wells, there may be three facility limitations: free water knockout, treating and water disposal. Pay attention to all three.

Cost Allocation and Shut-in Decisions

Check to ensure you've allocated your costs properly to fixed plant, fixed well and variable oil, gas and water. Improper allocation may result in making wrong decisions in respect to well profitability and the impact of well shut-in.

- ◇ Make economic decisions without existing plant costs because those costs will persist with or without a shut-in well and will not change if you add a new well.
- ◇ Do not use accounting definitions for determining fixed and variable costs – think of variable costs as production sensitive costs.
- ◇ Exclude average workover costs when making shut-in decisions. Continue to produce the well until it is truly uneconomic or until a workover is required and the well cannot bear the workover cost.





4. Plant and Battery Operations

Cash flow is not just found at the well. Make sure to take a close look at your plant and battery operations to ensure you're finding all the possible savings and operating efficiently.

Capacity Limitations

If your plant is operating at capacity, consider altering which wells you choose to produce. With high volume lift operations, choose to shut-in high water cut wells and increase production from low water cut wells where possible. For gas plants, there will be a trade-off between fixed cost and low-volume royalty incentives.

Liquid Yield

Carefully examine the economic value of your liquid sales products to determine whether they should remain in the gas or be sold separately. Can you extract ethane? Do you want to?

Are you receiving proper payment for your liquids? Most third-party plant operators will allocate liquid production in their favor.

Make sure that the gas analysis for your wells is current and that you have made this information available to the plant operator. Run liquid yield calculations using plant efficiencies and compare liquid production to your lease operating statements to identify potential plant allocation issues.

Plant Processing, Compression, Gathering

When was the last time you negotiated your fees? Plant operators will be trying to keep their plants full. If you have alternatives, this would be a good time to explore them. Can you be creative with your liquids or alter the processing terms?

Do you need your plant for strategic reasons? If not, consider selling to a midstream company and use the proceeds to cleanup your balance sheet or fund operations.

5. Production Forecasts

Monthly cash flow management is essential, and this requires accurate short-term production forecasts. Know whether your cost cutting measures will be enough and ensure that you can schedule additional capital spending if cash flow improves.

Cash Flow Management

Keep your production forecasts, operating costs and price estimates current. Your monthly cash flow projections must be current and accurate. You need to know whether you can pay the bills and which capital projects you can afford.

Rank your capital projects to identify those that are self-financing. These projects will payout during the current year and yield incremental cash flow. They will help keep the lights on or fund additional capital projects later in the year.

Analog Forecasts will provide the best short-term production forecast for wells that have very little production history. This method has been shown to predict two-to-three-year production volumes to within a few percentage points.

Workover and Operating Opportunities

Automatically forecast your wells using settings to allow a negative hyperbolic exponent. A negative exponent is indicative that there is progressive damage occurring in the well. There could be a leak in the tubing, wax buildup, scale deposition, plugging in the reservoir or a host of other maladies. This is your first clue.

Look for deviations from your most current forecast. This will provide early warning to a potential performance issue one would normally miss in a morning well review because the change is too subtle. Where possible, include daily production data for this review and look at each well at least once a month. This is the reservoir-engineering version of production surveillance.

6. GORR Royalty Income

Missing Royalty

Find instances where you are not being paid over-riding royalty or where the amount paid is too low. These opportunities have the potential to generate a large cash influx because the unpaid royalty may apply to the entire life of a well.





7. Quick Things To Do

Breakeven Analysis

Perhaps it's a good time to do a breakeven analysis on your producing wells to find the wells that can survive low prices, and review wells requiring high prices to break even. It's important to understand why some wells can withstand significant price changes and why others can't. This means you should be looking at the economics of wells that require \$30 oil to break even vs those that need \$80. What makes them different? Is there something that you can do to improve on the high-priced wells to make them more like the low-priced ones?

Understand the sensitivity to prices that your wells have. By checking different price points, you can plot a breakeven price slope to better understand these sensitivities.

Identifying Potential

Compare your well production to other operators in the area. Using public data and a bubble map is a good way to quickly visualize differences and zero in on anomalies.

Project Economics vs. Well Economics

Run project/field level economics to make better decisions rather than looking at just well level economics. Sometimes shutting in wells where there are significant fixed costs to be covered will just overburden your good wells and you may end up no further ahead. Identify wells that should be abandoned and lower your liability.

Review A&D Opportunities

Low price environments can create some excellent acquisition opportunities. They can also suggest a review of your portfolio and perhaps a sale of noncore assets.

Investing in engineering can improve organization agility, lower costs, productivity, and customer experience



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