GRAIN DRYER CONVERSION TO NATURAL GAS

Multiple conversion options exist, depending on a farm's geographic location, size, and distance to a natural gas pipeline. This fact sheet presents four potential conversion options and explains how to estimate conversion costs and return on investment.

Case Study

A farm in Ohio includes 2,000 crop acres and two hog barns. The farm uses 40,000 gallons of propane per year, and is one half mile from the nearest natural gas (NG) pipeline—owned by a local NG co-op. The farmer, interested in converting a propane grain dryer and barn heating to NG, talks to the local co-op's Prospective Member Services Department about installing a new service line to the farm. The service is advantageous for both parties: the co-op can expand its NG customer base, and NG is less expensive and more reliable for the farmer than propane. The farmer pays for the parts, labor, and permits to install the new NG service line and two NG meters from the co-op and to install new NG gas lines and burners for the grain dryer and hog barns.

"The process of switching to natural gas had a lot of moving pieces to figure out, but the consistent dryer temperature will yield a better product and the reliability of service plus cost savings will benefit many more generations after me."

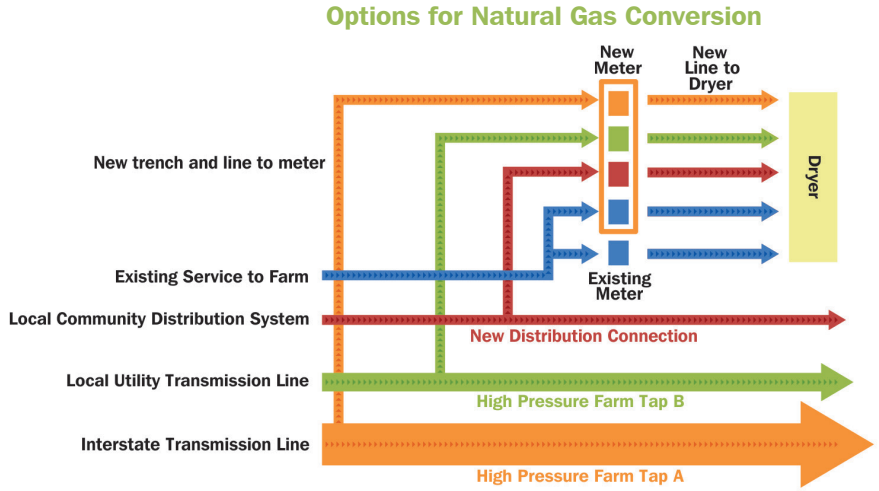
- Terry McClure

The farmer saves costs by obtaining a USDA Rural Energy for America Program grant and selling the service line back to the co-op, to eliminate maintenance costs. Major challenges include hiring licensed contractors to install the service line and convert the dryers/heaters in a remote location, and keeping track of all the points of contact and services needed to complete the conversion.

Total cost for the project is approximately $36,000. With an estimated fuel savings of $25,000 per year, the farmer's payback period is approximately one and one half years.

Conversion Overview

Common options available to farmers for converting grain drying from propane to NG include leveraging existing NG service to the farm, connecting to a local NG distribution system, or connecting to a large NG transmission line (local utility or interstate transmission). Depending on what is available to farmers, considerations include whom to contact, costs of the various steps, time to complete the conversion, and the return on investment. The examples on page 2 are estimates based on an average 2,000-acre farm, with an annual use of 20,000 gallons of propane and located one half mile from the nearest NG source.[1]



[1] Cost and time estimates are based on interviews with Ohio soybean farmers and open source research.

Connection Option	Extend Current Service to Additional Equipment/Buildings	Connect to Local Community Distribution System	Connect to Local Utility Transmission Line	Connect to Interstate Transmission Pipeline
Whom to Contact	Licensed installer	Local utility or co-op	Local utility	Transmission company
Estimated Costs	$5,000–$10,000	$15,000–$25,000	$80,000–$110,000	$100,000–$130,000
Estimated Time to Complete	3–6 months	6–12 months	1–2 years	1–2 years
Estimated Payback Period	less than 1 year	1–2 years	6–9 years	8–11 years

Determining Economic Feasibility of Converting to Natural Gas

Many factors can affect the cost of converting to NG for grain drying and heating. The following information on pages 2 and 3 explains how to estimate a return on investment for such a process, based on an average 2,000 acre farm with an annual use of 20,000 gallons of propane and one half mile distance to the nearest NG source.

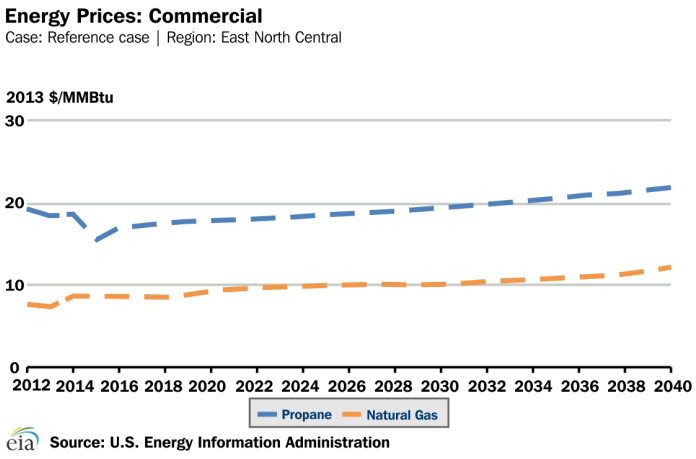
Fuel Cost Comparison

Propane and natural gas exhibit different energy content as well as prices; a level comparison demands calculation of equivalent units. Key factors in comparing fuel prices:

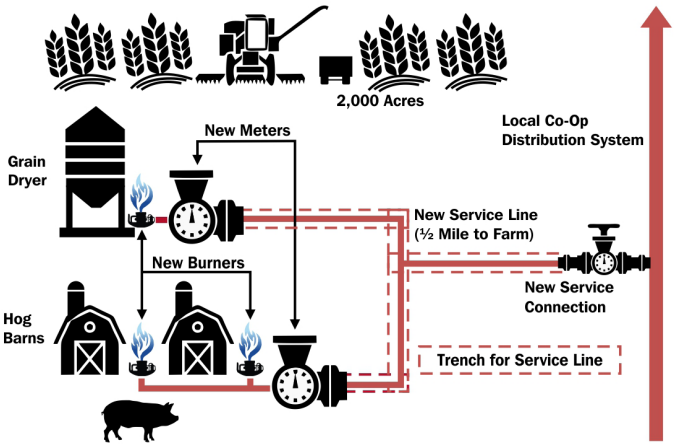
- Propane prices are typically in $/gallon (gal), while NG prices are typically in $/100 cubic feet (ccf)
- Fuel energy content is measured in British thermal units (BTU); equivalent units for both fuels are $/million BTU (MBTU)
- Propane has 91,500 BTU/gal, while NG has 104,000 BTU/ccf

Propane costs **$1.33/gal**,[2] with an equivalent price of **$14.54/MBTU**. NG costs **$0.78/ccf**,[3] with an equivalent price of **$7.50/MBTU**. If a farm uses 20,000 gal of propane per year at a cost of $26,600, the energy equivalent cost of NG would be $13,725, indicating a **savings of $12,875 per year**.

Propane and Natural Gas Prices 2012-2040



Case Study Farm



[2] Propane cost is an estimate based on pricing from Ohio bulk propane vendors on 5/23/2016.

[3] NG cost is an estimate based on pricing from Ohio local NG utilities on 5/23/2016.

Dryer Conversion

Converting a grain dryer to NG requires accessing the NG source, connecting the NG source to the farm, and converting the existing propane dryer to NG. Each has associated cost factors, including parts, labor, and permits.

Accessing NG Source—Four common options for gaining access to NG:

- **Existing connection:** leveraging a farm's existing NG connection entails no cost for access.
- **New distribution connection:** the cost for connecting to a local community distribution system is typically included in connecting this NG source to the farm (see below, Connecting NG Source to Farm).
- **High pressure farm tap for local transmission:** installing a farm tap may cost **$80,000** or more.
- **High pressure farm tap for interstate transmission:** installing a farm tap may cost **$100,000** or more.

Connecting NG Source to Farm—Key cost factors for bringing the NG from the source to the farm:

- Distance from the farm to source
- Trench for new lines
- New meter
- Parts for new lines and new meter
- Expected NG load for the farm
- Labor and permits

Estimated totals per NG access option: **$3,000**, **$17,000**, **$19,000**, **$19,000**

Converting Existing Dryer—Key cost factors for converting the existing grain dryer to using NG:

- Distance from meter to dryer
- New trench and lines to dryer
- New NG burner
- Parts for new lines and burner
- Labor and permits

Estimated totals for all NG access options: **$6,000**

Return on Investment

Near-term returns can be calculated by dividing the total cost of the conversion by the potential fuel savings:

- **$9,000 cost / $12,875 savings = approximately 0.7-year payback period**
- **$23,000 cost / $12,875 savings = approximately 1.8-year payback period**
- **$105,000 cost / $12,875 savings = approximately 8.2-year payback period**
- **$125,000 cost / $12,875 savings = approximately 9.7-year payback period**

Returns on investment are achieved faster when farms also use NG for other purposes, such as heating livestock barns or other buildings.

Funding support opportunities (e.g., government grants, loan programs, rebates for equipment) may offset some costs.

Long-term returns may be considered to weigh the benefits of converting to NG:

- The U.S. Energy Information Administration estimates that equivalent NG prices will remain relatively lower and more stable than propane prices over the next 25 years (see Propane and Natural Gas Prices 2012-2040 graphic on page 2).
- Less-expensive, more-stable NG prices equate to long-term energy resilience for Ohio soybean farmers.
- Once implemented, NG service will be continuously available, whereas propane requires truck delivery.
- Future generations of farmers who operate farms with existing NG will be less susceptible to hardship from energy availability, reliability, and price volatility.

Resources for More Information

Natural Gas Consumer Information:

Public Utilities Commission of Ohio
http://www.puco.ohio.gov/puco/index.cfm/information-by-industry/natural-gas-consumer-information

Funding Support:

Contact the Ohio Rural Development Energy Coordinator (http://www.rd.usda.gov/oh) regarding the Rural Energy for America Program - Renewable Energy & Energy Efficiency.

Visit the USDA's Farm Service Agency for available loans
http://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index.

Ask the local utility if they offer incentives (e.g., grants, rebates) for efficient/innovative energy solutions (e.g., NG installation), or your jurisdiction if they have a Revolving Loan Fund that can be leveraged for NG infrastructure and installation.

The State government of Ohio also offers energy efficiency resources:
https://development.ohio.gov/bs/bs_renewenergy.htm.

Ohio Soybean Council Natural Gas Conversion Worksheet:

Contact the Ohio Soybean Council (http://www.soyohio.org/council/contact-us/) to obtain a worksheet for calculating costs and payback period for converting grain drying from propane to NG use. The following information is entered into the worksheet to generate the calculation:

- Annual propane use (in gallons) _____
- Current propane price (per gallon) _____
- Current natural gas price (per ccf) _____
- Distance from the NG source to the new meter location (in feet) _____
- Distance from the meter location to the dryer (in feet) _____
- Estimates provided by utility or co-op for parts and labor _____

This information is brought to you by Ohio soybean farmers and their checkoff.