There Is But One True Hub, and His Name Is Henry

Jeff D. Makholm

The world is full of gas trading "hubs." Some are shown in **Exhibit 1.**

Indeed, there are many more gas hubs than these. The US Energy Information Administration (EIA) lists about 30 "Market Center Hubs" (from Sumas at the Canadian/US border in the Pacific Northwest to the Waha Hub in West Texas to the Algonquin City Gate Hub near Boston).[1] Europe also has many hubs, with EU sources listing two as "mature," two more merely as "active," four as "poor," and eight as "inactive."[2]

What are these gas hubs? What do they do? Answering either question is not easy. The question of hubs for natural gas represents the intersection of commodities markets, financial derivative markets, pipeline markets, and regulatory policy. It is virtually impossible to find people who are authoritative sources in all four areas. It is hard enough to find anyone who can describe what their own particular hub does in plain language (without resorting to the nomenclature I call "hedge-speak" or references to obscure regulations).

Part of the problem is the use of one term for different things—the term "hub" itself. The term "commodity trading hubs" to most people dealing with commodities markets means cities like Singapore, London, and Rotterdam—where the major commodities dealers have their headquarters. Identifying "gas trading hubs" may produce the list above and many more, but a closer look reveals that one hub is not like another. Some hubs are places on a map; others are "notional" (hypothetical) places within a region's pipeline system. Some hubs are places where the title to gas changes from seller to buyer as the gas passes a particular meter; others are not only that but specific locations against which financial speculators can trade in derivative contracts for future delivery—either in the gas itself or in the cost of getting it from one spot to another on time. As with many issues in the international market for gas, the term "hub" does not translate well from one place to another.

The garbled meaning of "hub" is unique to gas—other commodities do not have such problems defining what a hub means. Why is this so? The answer is that natural gas is a uniquely inconvenient commodity.

What goes on at gas hubs reveals less about gas commodity trading than about the way governments regulate.

Alone among either "soft commodities" in agricultural products (such as wheat, coffee, cocoa, and sugar) or "hard commodities" in mined minerals and hydrocarbons, gas needs pipelines to reach even the smallest consumers. Other soft and hard commodities can use roads, rivers, railroads, and airplanes to reach inland destinations, but gas cannot. How governments regulate the gas industry's pipeline infrastruc-

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 DOI 10.1002/gas.21912

Exhibit 1. Hubs

	Hub Name	Hub Creator	Date Created
North American Gas Hubs	Henry Hub	NYMEX	1990
	Dominion South	Dominion Transmission	2012
	NOVA	Nova Gas Pipeline	1993
European Gas Hubs	UK NBP	British Gas	1996
	TTF	Gasunie	2002
	NCG	Net Connect Germany	2013
Other Gas Hubs	Wallumbilla (Australia)	ASX	2015
	Chinese Hub	Xinhua News and NDRC	2015

ture determines how "hubs" operate and whether gas markets work like hubs in other modern commodity markets—like crude oil or corn. Indeed, what goes on at gas hubs reveals less about gas commodity trading than about the way governments regulate the pipelines that gas markets cannot do without.

I sort gas hubs into three categories:

1. *Physical hubs,* where gas passes a meter station on defined pipeline facilities
2. *Notional hubs* that refer only to a hypothetical point within a particular pipeline system
3. *Fictional hubs,* created mostly for show—the *sound* of a competitive gas market where the political or *pipeline structure* in place does not exist to support one

PHYSICAL HUBS

The oldest gas hub is the Henry Hub, created by the New York Mercantile Exchange (NYMEX) to begin trading in 1990. At that time, the United States was moving away from a tortured history of field gas-price regulation—an era of problems stretching back to the early 1950s and the infamous *Phillips* decision of the Supreme Court.[3] The financial industry wanted to participate in trading gas-price risk in the new, structurally competitive gas market.

For its role in supporting a highly successful futures market, the Henry Hub stands alone.

NYMEX needed a registered location at which to settle the ultimate delivery of gas futures contracts—as is the case for other commodities such a crude oil[4] or corn.[5] The Henry Hub chosen by NYMEX was both convenient and capable of dealing with gas arriving from many locations—the facilities, owned by Sabine Pipe Line LLC, connect to nine interstate and four intrastate gas pipelines.[6] For its role in supporting a highly successful futures market (the full "financialization" of gas), the Henry Hub stands alone. It is the only place in the world where financial markets trade in the price risk of gas for future delivery as it trades in future in other bulk commodities—buying and selling standard gas lots many times before the final buyer takes delivery at the specified delivery location (about 26 sales before delivery for gas at the Henry Hub, compared to about 31 times for US corn at exchange-registered warehouses).[7]

There are many other physical hubs in North America where the financial markets trade in locational delivery derivatives (called "basis swaps," tied to differential spot prices between Henry Hub and some other hub). However, the financial markets tie those swap settlement prices back to the Henry Hub. With the great growth in unconventional gas production in Pennsylvania's Marcellus Basin and the northward shift in the center of US gas production, another hub—Dominion South in southwest Pennsylvania—has attracted interest as its short-term traded volumes surpass those at the Henry Hub.

But while Dominion South's volumes are huge and growing, the Henry Hub is still the benchmark for US gas futures settlements. If gas traders want to buy or sell long-term futures at Dominion South, they use the Henry Hub as the benchmark and simply transfer those prices to Dominion South through basis swaps. The Henry Hub, with its well-defined and multipipelined location, remains the single fulcrum for futures trading in the North American gas market.

Most organized futures markets extend only a relatively short period ahead (from one to two years). Thereafter, while price discovery may extend further, the number of trades and contracts outstanding (known as "open interest"), and, hence, the liquidity of the market for those trades, drop sharply. The same is true for the Henry Hub, as shown in **Exhibit 2** for a representative period in 2009 (before the shale boom drove all gas prices down).[8]

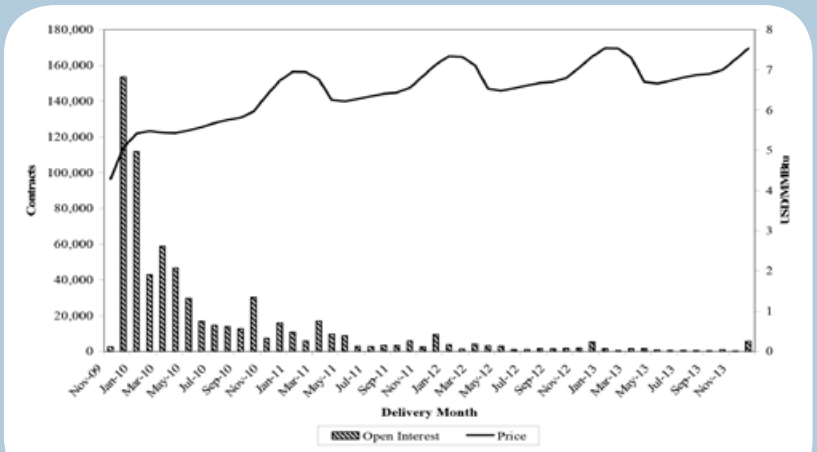
NOTIONAL HUBS

I referred to notional gas trading hubs as "gas islands" in a previous column in this publication.[9] Two of those notional hubs are Alberta's Nova Inventory Transfer (NIT) hub and the United Kingdom's National Balancing Point (NBP).[10] Both notional hubs see a lot of gas trading—but almost no futures market activity compared to the Henry Hub.

The Nova gas pipeline system, unique in North America, provides transport services without pipe-

  / DOI 10.1002/gas

Exhibit 2. Henry Hub Natural Gas Futures Prices and Open Interest



Source: Data obtained from NYMEX and as of October 28, 2009.

line-specific contract paths within its network—reflecting a complicated commercial history rooted in its original taxpayer funding through the province. Shippers pay a fee to enter the network and another to exit—as if the system were a large tank. Gas trades happen somewhere between those locations, with the logistics handled by Nova. NIT gas trading is somewhat vigorous—with gas trading, on average, six times before physical delivery (the "churn ratio").[11] But it is spot—i.e., next-day—trading only. There is no futures market like the Henry Hub.

The NBP also operates like a large tank, with gas entering at particular places and exiting at others. The NBP's churn ratio is around 17.[12] But futures trading at the NBP, while offered, is virtually nonexistent by reference to the Henry Hub.[13]

Futures markets fail at the NIT and NBP because the pipeline regulatory systems constructed for the Nova and privatized British Gas systems (the latter now owned by National Grid Gas) expressly obscure their physical operation. Both notional systems came about as a result of pressures to open up third-party gas trading on pipeline systems that had not grown up around licensed, contract-based services on specific facilities (like those in the United States).

Bowing to pressure to provide a vehicle for third-party gas trades in an era before contract-based open access, both Nova and British Gas offered location-free trading—a regulatory shortcut to quick gas trading. Such "notional" trading opened the door usefully to gas trading. But the regulatory shortcut had two unfortunate consequences: (1) the notional system barred competitive entry for gas transport within the reach of the Nova and British Gas systems, for as a practical matter it is impossible to compete with any transport provider that does not charge for the use of specific facilities that a competitor may bypass; and (2) without specific facilities (and reliable means to get to those facilities), financial markets had no tangible delivery point against which to reliably deliver futures contract volumes.

FICTIONAL HUBS

What I label "fictional hubs" are those points created by regulators and other governmental bodies (or even exchanges) around the world under the hopeful belief that simply naming a point will attract competitive activity.[14]

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The many EU continental gas hubs, the Wallumbilla hub in Australia, and the Chinese hub are all fictional hubs in this way. Gas may trade at these hubs between those Europeans, Australians, or Chinese who own the gas in the pipelines in those regions, but the structural conditions for competitive transport do not exist in any of those places: the European Union's is a collection of UK-style entry/exit regions with notional hubs; the Australian pipeline system is largely unregulated without the necessary transparency for competitive pipeline access; and the Chinese system is

DOI 10.1002/gas

itself effectively closed to competitive gas production or pipeline access. Thus, there is no practical means for competitive access to those hubs or for those hubs to satisfy the needs of the financial market against which to define futures contract deliveries.

They are hubs in name only with no useful role and nothing to do—or "inactive" as the European Union labels most of its.

CONCLUSION

Liquefied natural gas tanker prices on the high seas, unconventional gas production from the Marcellus field, complex price-setting arbitrations in Europe and Australia, and Russian studies of the value of East Siberian gas—still in the ground and someday destined for Beijing and Shanghai—all eventually reference the Henry Hub, even if it may be half a world away. The world knows that there is something special about the Henry Hub. But given the proliferation of other "gas hubs," the world seems to be a bit vague on why.

The Henry Hub is unique for key reasons. It sits at a unique junction of independent pipelines within a genuinely competitive continental pipeline transport system (representing three-quarters of all the world's gas pipelines). That competitive transport system itself came about through path-breaking regulatory reforms that had developed fully enough by 1990 for NYMEX to seek the best place to "financialize" gas—permitting gas to join the other hard and soft commodities where price risk is traded in financial markets.

The Henry Hub's role in futures markets has resisted duplication even within North America. There is no possibility to duplicate its role anywhere else in the world until and unless other regions' pipeline systems also provide competitive transport—to and from the kind of physical delivery locations required by organized commodities futures exchanges. Notional hubs cannot substitute. Such hubs, designed to obscure physical operations, may facilitate gas trading within pipeline systems. But as *ad hoc* regulatory constructions separated from any particular location, notional hubs are no substitute in the eyes of financial markets for the known location and quantity of exchange-authorized delivery facilities.

Ultimately, genuine commodity hubs that can support futures markets *follow* competitive commodity markets—which depend on the ability of competitors reliably to ship commodities to those points for future delivery—which depends on competitive access to transport. Given the unique nature of gas as a commodity, the demands of a genuine gas futures trading hub are severe.

Genuine commodity hubs that can support futures markets *follow* competitive commodity markets

Considering what drives the financial industry's participation in commodities futures markets, it is no surprise that the Henry Hub is the only one.

NOTES

1. EIA. (2009). *Natural gas market centers and hubs in relation to major natural gas transportation corridors, 2009*. Retrieved from https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/MarketCenterHubsMap.html.
2. Oxford Institute for Energy Studies. (2016, March). JOGMEC seminar presentation.
3. In *Phillips Petroleum Co. v. Wisconsin*, the Supreme Court in 1954 upheld a lower court ruling that federal regulators must set the price of gas. See Sanders, M. E. (1981). *The regulation of natural gas: Policy and politics.* Philadelphia, PA: Temple University Press; p. 95.
4. For example, the delivery point for West Texas Intermediate crude oil futures is "any pipeline or storage facility in Cushing, Oklahoma with pipeline access to Enterprise, Cushing storage or Enbridge, Cushing storage." CME Group. (2009). *NYMEX rulebook.* Retrieved from https://www.cmegroup.com/rulebook/NYMEX/2/200.pdf.
5. Delivery of corn "shall be made by the delivery of registered warehouse receipts issued by warehousemen against stocks in warehouses which have been declared regular by the Exchange." Ibid.
6. Makholm, J. D. (2012). *The political economy of pipelines*. Chicago: The University of Chicago Press; p. 118.
7. Sources for these ratios: US Energy Information Administration, US Department of Agriculture, and Bloomberg.
8. See NV Energy, 2010–2029 Integrated Resource Plan, Docket No. 09–07003, Pre-filed direct testimony of Jeff D. Makholm.
9. Makholm, J. (2015, October). "Entry/exit" pipeline pricing in gas "island" enables EU to resist competition. *Natural Gas and Electricity*, *32*(3), 27–29.
10. The NIT is also commonly referred to as "AECO" after the Alberta Energy Company that developed storage in southern Alberta. That is because title transfers were first provided as a "hub" service at the first AECO facility (Suffield) in the early 1990s,
11. The churn ratio is the measure of the number of times a parcel of a commodity is traded and retraded between its initial sale by the producer and final purchase by the consumer (http://www.albertaoilmagazine.com/2009/10/energy-shopping-center/).
12. See: Heather, P. (2010, August). *The evolution and functioning of the traded gas market in Britain*. Oxford Institute for Energy Studies, NG 44.
13. The NYMEX US gas futures were 333,000 times the level of such trades on the Intercontinental Exchange for Europe, including the NBP in 2013. See Makholm, J. (2015, Winter). Regulation of natural gas in the United States, Canada, and Europe: Prospects for a low carbon fuel. *Review of Environmental Economics and Policy*, 9(1), 107–127.
14. This is reminiscent of the line in the 1989 movie *Field of Dreams*: "If you build it, he will come."

  / DOI 10.1002/gas