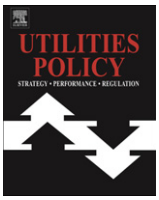
Utilities Policy, Vol. 21, 50-58. http://dx.doi.org/10.1016/j.jup.2011.12.003
Utilities Policy xxx (2012) 1–9

Contents lists available at SciVerse ScienceDirect

Utilities Policy

journal homepage: www.elsevier.com/locate/jup



Regulatory reform options to revitalize the US natural gas value chain

Ruud Weijermars*

Alboran Energy Strategy Consultants, and Department of Geotechnology, Delft University of Technology, Stevinweg 1, Delft 2628CN, The Netherlands

ARTICLE INFO

Article history:
Received 19 September 2011
Received in revised form
10 December 2011
Accepted 11 December 2011

Keywords:
Natural gas
Regulatory reform
Rate cases
Regulation reform

ABSTRACT

The key question addressed here is whether US utilities can sustain their current natural gas deliveries, and fund growth, as strategically required for the clean energy transition. A case is made here for adjusting regulatory policy, as past and current policies have led to a steady profit decline for mid- and downstream US energy companies. Capital markets have rated several major energy companies as 'junk bonds', which means default risk is substantial from an investor perspective. Arguably, overly tight price regulation and declining credit ratings have pushed the industry into a decade-long downward business cycle, which started even before the Great Recession provided additional challenges. Recommendations are formulated for improving the US energy regulation of the mid and downstream natural gas segments in order to revitalize these key pillars of the energy transition program. Insights developed here based on the regulatory development and business performance of energy utilities in the US may provide a useful reference for liberalized and liberalizing energy markets elsewhere in the world.

1. Introduction

Energy policy reviews and adjustments remain extremely important for the reconciliation of any clean energy vision, its strategy design and its successful implementation. This study aims to contribute to the energy transition discourse by highlighting the critical role of regulation for the natural gas industry's growth opportunities in step with the clean energy transition. Natural gas remains an important transition fuel: it provides an affordable alternative to coal and oil heating, and is commonly seen as a relatively clean transition fuel needed to switch power stations from polluting coal to gas-fired generators (Jaccard, 2005). Renewable energy technologies will mature to eventually replace fossil fuels altogether, but this takes time (Kramer and Haigh, 2009). Meanwhile, the return on invested capital of natural gas distribution of US energy utilities has generally been lower than their cost of capital over the past decade. The vitality of the natural gas value chain is arguably jeopardized by the tight regulatory regime that was basically put in place long before the energy transition became politically important.

One may ask: "*Can US utilities, with tight regulation of earning capacity and declining credit ratings, provide safe and uninterrupted service to sustain the transition from coal to natural gas as envisioned in the clean energy transition?*" The considerable risk and uncertainty in the earnings of gas utilities is not adequately compensated for in the current GRC (General Rate Case) method applied to regulate their earnings. This is because lower credit ratings have pushed up their cost of capital to a level which cannot be covered by the compensation rates allowed in GRC regulation (see later). However, a vital natural gas value chain remains essential for the clean energy transition. Regulation therefore must ensure fair compensation for utility services rendered in this ambitious energy transition era. Action is also prompted to restore investor trust in US energy utilities, which expect rates of return on their equity investment that remain competitive and attractive. This study shows that an increasing section of the mid and downstream US natural gas industry shows early signs of financial problems. This problem is not generally recognized and regulators must keep this in mind in future rate applications.

This study highlights the critical role of capital markets and credit ratings for the financial management of energy utilities. A growing proportion of US transmission and energy utility companies have become junk-bond rated. The business decline for US energy utilities is substantiated in ten arguments listed in Section 2. The revenues and earnings profile of the US natural gas value chain are summarized, and a plea for regulatory philosophy change on rate making is elaborated in Section 3. Recommended options for amendments to the current regulation principles are formulated in Section 4. European regulatory systems are still developing and the opportunities offered by new insights developed here are emphasized in Section 5.

* Tel.: +31 655 873 136.
E-mail address: R.Weijermars@TUDelft.nl.

0957-1787/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jup.2011.12.003

2. The problem: business decline for US energy utilities

This study lists 10 arguments to substantiate the assertion that the US energy utilities are in business decline.

2.1. Fortune Global 500 absence of utilities

The Fortune Global 500 of the world's leading companies, which quoted a 2009-threshold revenue of 18.5 billion USD for the last number 500 entry in 2009, has no US utility entry. The complete absence of US energy utilities from the Fortune Global 500 listing indicates that excessive capital gains have not occurred over the past decade in US energy utilities at large. For the public perception of the profit generation capacity in the energy business, it is continually important to explain that energy utilities do not benefit in principle from higher or lower natural gas wholesale prices. By law, utilities may not charge more for natural gas deliveries than they pay to get it; only the cost of distribution assets and services are chargeable. When wellhead prices drop, wholesale prices at the spot markets will follow, and utilities retail prices must be adjusted downward. For example, when US natural gas wellhead and wholesale prices fell in the first half of 2009, gas utility companies sought permission from Public Utility Commissions in their respective states for downward correction of their retail prices in September 2009. These rate cuts for retail gas, with the effect of lowering customer bills, were substantial, e.g., 21% for Avista Utilities in Oregon, 17% for Pudget Sound Energy in Washington, 20% for Questar Gas in Utah, and 22% for Intermountain Gas in Idaho (SNL Energy Natural Gas Weekly, September 2009).

A further inventory of the ranking of energy utilities on the Fortune 500 (US companies-only, which sets it apart from the Fortune Global 500) shows a stable overall ranking pattern, which is based on annual revenue size only. The 2009 annual revenues for the principal US energy utilities range between 5 and 18 billion USD (Table 1). Overall, no significant improvement in ranking has occurred for the US Fortune 500 utility peer group over the past decade. Some would call this a success (e.g., consumer advocacy groups), whereas the lack of steep revenue growth (assuming commensurate profit growth) may be called a failure by others (e.g., investors). Many energy utility companies have combined natural gas and electricity services (Weijermars, 2010b).

2.2. Cost of capital not covered by returns on invested capital

The authorized cost of capital for energy companies commonly ranges between 8 and 8.5%. An inventory of the Returns on Invested Capital (ROIC) over the past decade shows that for the major US Midstream companies the ROICs cannot cover the cost of capital (WACC, Table 2). Companies that produce ROICs lower than their WACC erode value, which is commonly compensated for by asset sales. These companies can only pay the imminent cost of new investment projects by divestment of existing assets, accounting on average for 30% of the capital expenditure (CAPEX) and net cash from operations pays for the remainder (Weijermars, 2011). Investors in midstream segment have seen their ROE dwindling (Table 2), and investors may conclude they should be putting their money elsewhere.

The ROICs of US Downstream utilities for the past decade is 7.8% (Table 2), taking a peer group of six representative companies (SRE, GAS, STR, EXC, ED and TEG). This ROIC almost matches their cost of capital (WACC). Cash flow analysis for this peer group reveals that operationally generated net cash is supplemented by some 10% asset sales, which suffices to pay for new capital investment projects. For all 12 mid and downstream energy companies studied in Table 2, financing activities have not raised new net cash, according to cash flow averaged time-series over the past decade. New debt paper was only issued to replace maturing old debt paper. This does not mean that the industry does not need more capital. Instead, this means that the industry has maximum gearing and cannot attract more debt capital. The asset base is not growing, so new equity capital issuance is not effective either. That is why new capital investment projects need partial financing from divestments sale proceeds. Investors in most utilities have still received acceptable Returns on Equity (ROE, Table 2), but returns for some companies have become less competitive or even negative.

Table 1
Ranking of representative US Top energy utilities among US Fortune 500 Companies (1997, 2007, 2009).

Company	Rank 1997 performance	Rank 2007 performance	Rank 2009 performance	2009 Revenue Billion USD
CMS	315	341	369	6.8
ConEdison	208	204	191	14.1
Dominion	292	140	157	16.3
Duke	81	143	204	13.2
El Paso	281	449	443	8.4
ENRON	57	–	–	–
Exelon	318	150	134	17.6
Integrys	–	–	185	14.1
PG&E	85	196	176	14.6
Reliant	230	229	214	12.4
Spectra	–	–	459	5.2
Williams	337	211	218	12.4
Overall ranking points	2147 (*)	2063 (*)	2106 (*)	

(*) Excluding ENRON, Spectra and Integrys for continuity of comparison.

2.3. Credit-rating decline of utilities

The credit ratings for US energy utilities have significantly declined over the past decade. Table 3 provides a credit rating summary of US energy utilities and substantiates their decline in creditworthiness over the past decade. In Q1 of 2010, only one fifth of the companies had a sound A- or higher credit rating, and 72% had a lower rating (BBB+, BBB, or BBB-), with the notion that BBB- is the lowest investment grade rate. The remaining 8% of the utilities are junk bond rated. In 2001, a firm 42% of the companies had sound A- or higher ratings, and only 50% of the companies had BBB+, BBB or BBB- ratings. What is more, 23% of the utilities have low BBB- ratings in 2010, while this applied to only 10% of the utility peer group in 2001 (IEE data base). Table 3 clearly testifies to the worsening creditworthiness of the US natural gas industry. For

Table 2
Return on invested capital US energy utilities (10 year averages for 2000–2009).

	ROIC %	WACC %	ROE %
Midstream average	**2.7**	**~8.5**	**4.4**
• El Paso	−1.3	~8.5	−7.0
• CMS Energy	−1.2	~8.5	−6.0
• Williams	1.6	~8.5	2.7
• Ni Source	2.6	~8.5	5.9
• Dominion	5.0	~8.5	11.9
• Kinder Morgan	9.3	~8.5	9.3
Downstream average	**7.8**	**~8.5**	**14.7**
• ConEdison	5.2	~8.5	10.2
• Integrys	5.2	~8.5	10.0
• Excelon	7.8	~8.5	18.4
• Sempra	8.9	~8.5	17.5
• Nicor	8.9	~8.5	14.1
• Questar	10.8	~8.5	17.8

ROIC = Return on Invested Capital; WACC = Weighted Average Cost of Capital; ROE = Return on Equity; ROIC and ROE from Morningstar, 10 year average period 2000–2009.

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

Table 3
Summary of S&P credit ratings for the major US natural gas utilities (2001 Vs. 2010).

	Investment grade debtors		Non-investment grade debtors
Credit ratings	A– or higher	BBB+ to BBB–	Junk status (BB+ or lower)
Anno 2010	20%	72%	8%
	13 companies	48 companies	5 companies
Anno 2001	42%	50%	8%
	30 companies	26 companies	6 companies

Standard & Poor's, SNL Financial, EEI Finance Department, and company annual reports.

a comparison, the creditworthiness of the midstream gas transmission segment is summarized in Appendix A; the upstream oil and gas industry has been reviewed elsewhere (Weijermars, 2011).

The main reason why credit ratings declined is that energy utilities cannot generate sufficient cash flow from operations and therefore must increasingly supplement their income gap by financing activities. The required cash can be raised either by issuing new equity or new debt paper. Because of their lagging cash flow, utilities are commonly highly geared in debt. When such debts mature and redemption payments are due, new long-term debt is taken on by these companies and the interest cost charged is based on the creditworthiness of the company. The world's leading credit rating agencies (Fitch, Moody's, S&P, RBS) regularly provide credit rating reports for energy utilities according to globally accepted risk rating systems (e.g., Sylla, 2002). An inventory of the creditworthiness of energy companies provides a litmus test for their financial vitality.

The credit rating picture for the Mid- and Downstream energy segments is much worse than that of the Upstream energy segment: BBB+, BBB, and BBB- ratings have now become the norm for most mid and downstream US energy companies. In contrast, Exxon has a sound AAA credit rating, and other large upstream companies commonly have AA or A ratings (for a recent inventory of the credit situation of the Upstream oil and gas business, see Weijermars, 2010c, 2011).

Table 4 provides a detailed overview of the creditworthiness of the US Top 20 investor owned utilities, based on a 2006 inventory of the leading US utilities (Tobin, 2008). The US Top 20 investor owned LDCs jointly delivered 22% of the US total natural gas market volume (22 Tcf) in 2006. In fact, all LDCs together accounted for only 60% of the total volume, as 40% is delivered directly to the major industrial end-users via dedicated trunk lines from interstate and intrastate transmission providers (Tobin, 2008). The LDCs in Table 4 provide a fair representation of the US investor owned LDCs, because the other 38% of the market is served by of 237 smaller investor-owned companies (23%), 931 municipal owned (4%), plus 104 privately-owned and 15 co-operations (jointly serving 1% of the LDC market, based on data from Tobin, 2008).

A reduction in creditworthiness results in a situation where a company in need of capital must pay the highest interest rate with no alternative income sources left. For example, El Paso had to resort to junk bond issuance to replace maturing debts in 2008 at the height of the credit crisis. Fig. 1 provides examples of return rates on Baa investment grade and non-investment junk bond grade high yield bonds over the period covering the height of the credit crisis. Typically junk bonds are high yield bonds, because bonds issued to non-investment grade companies are only attractive to the prudent investor if premium returns compensate for the higher risk. The reference is provided by Treasury bills and the so-called spread, which states the premium over the T-bill rates. The exceptionally high interest rates paid of 12.3% by El Paso Energy Corporation on its bond issue of December 2008 are due to concurrent market conditions and lagging cash flow performance in combination with its BB- credit rating.

2.4. Decline of authorized rates

The US has chosen for a rate-of-return approach where regulatory agencies fix the rate of return that a utility company can charge. Two principal segments can be distinguished, with a midstream transmission segment, regulated by FERC, and a downstream distribution segment, regulated by the State Regulators (commonly a Public Utility Commission). There is explicit and powerful involvement of consumers in the regulatory process. In many states, the regulator mostly facilitates the negotiated settlements of rate cases between the consumer advocacy groups and the energy utility firm. The authorized rate of return on equity for utilities has steadily declined over the past two decades (Fig. 2).

Additionally, utilities are discouraged by GRC regulation to have a high equity ratio (say 75% would be high) because that would

Table 4
Top 20 major investor owned LDCs in the US.

LCD	2006 Volume delivery (Tcf)	State	Parent company	2010 Credit rating (S&P)	NYSE symbol
Southern California Gas Co.	0.810	California	Sempra utility (*)	BBB+	SRE
Pacific Gas & Electric Co.	0.723	California	PG&E	BBB+	PGE
Nicor Gas Inc.	0.424	Illinois	Nicor	A	GAS
Atmos Energy Corp.	0.322	Texas	Atmos	BBB–	ATO
Consumers Energy Co.	0.309	Michigan	CMS Energy	BB+	CMS
Public Service Electric & Gas Co.	0.306	New Jersey	PSE&G	BBB+	PEG
Consolidated Edison New York Inc.	0.262	New York	Conedison	A–	ED
Columbia Gas Distribution Co.	0.254	Ohio	NiSource	BBB–	Ni
Dominion East Ohio Gas Co.	0.243	Ohio	Dominion Resources	A–	D
Northern Indiana Public Service Co.	0.234	Indiana	Nisource	BBB–	Ni
Public Service Co. of Colorado	0.226	Colorado	Xcel Energy	BBB+	XEL
Atlanta Gas Light Co.	0.209	Georgia	AGL Resources	A–	ATG
Keyspan Energy (Long Island)	0.177	New York	National Grid USA/Plc	BBB+	NGG
Keyspan Energy (Brooklyn Union Gas Co.)	0.169	New York	National Grid Plc	BBB+	NGG
Peoples Gas Light & Coke Co.	0.165	Illinois	Integrys Energy Group	BBB+	TEG
Centerpoint Energy Inc. (Minnegasco)	0.144	Minnesota	Centerpoint Energy	BBB–	CNP
Southwest Gas Corp.	0.144	Nevada	Southwest Gas Co.	BBB	SWX
Piedmont Natural Gas Co.	0.134	North Carolina	Piedmont Natural Gas	N/A	PNY
Questar Gas Co.	0.128	Nevada	Questar	BBB+	STR
Atmos Energy Corp.	0.127	Louisiana	Atmos	BBB–	ATO
Total volume top 20 utilities	5.509				

(*) Sempra is 51% owned by RBS via holding company RSC. Volumes from Tobin (2008) and ratings from Standard & Poor's and company annual reports.

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

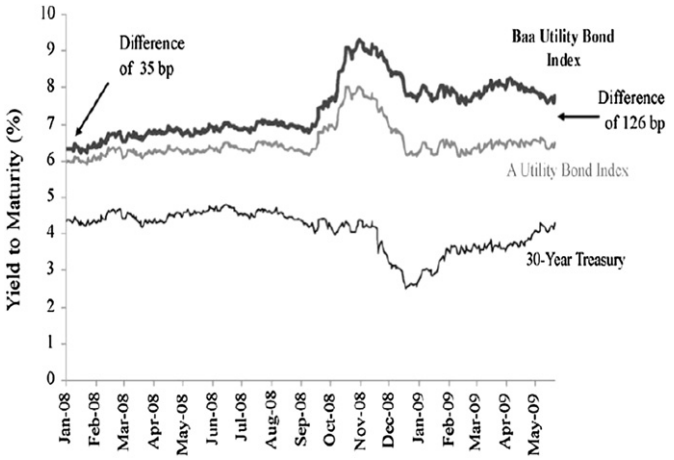


Fig. 1. Variations in interest rates charged on BBB (Baa) rated utility bonds, A-rated bonds and US Treasury T-bills (data from Bloomberg and US Treasury Department).

result in higher ROEs factored into the ROR ruling. A high debt-ratio (50% or more) is mandatory because that generally makes the authorized cost of capital (WACC) lower (see point below). The idea is that utility bills to the end consumer will then be lower, assuming the cost of debt financing of the utility company is generally lower than equity financing. This logic fails, however, when the cost of debt capital becomes higher than the cost of equity capital (see below).

2.5. Increase in WACC, non-authorized

The effect of differences in creditworthiness for energy companies is that access to unsecured debt (i.e. debt without an equity stake in return for the cash provided) is cheaper for some than for others, based on their credit rating. Table 5 shows the effect on the weighted cost of capital for a company like El Paso. The company's bonds mature in December 2013, and market conditions may be better or worse for refinancing the debt.

Normally, debt financed capital has lower interest rates than market rates for equity financing, but this is defied by junk bond status ratings. Table 5 shows how companies that have poor credit ratings may face real cost of capital factoring into their WACC, that is much higher than the authorized WACC. The Cost of Capital Mechanism (CCM) adopted by most states authorizes for utilities with BBB credit rating or lower only Moody's published Baa utility bond interest rates – these are commensurate with BBB bond rates -, which leaves a gap for non-authorized rates of junk bonds at the expense of the utility.

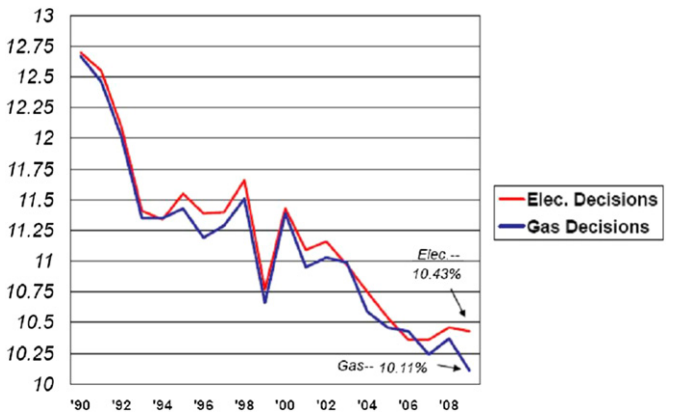


Fig. 2. Decline of authorized ROE for utilities in rate case decisions (data from SNL Energy, with kind permission granted by SNL Research President Robert Schain).

Table 5 shows a utility company with a real cost of capital at 11.03% and authorized cost of capital at only 8.15%. The gap of 2.78% between the real and authorized cost of capital cannot be charged to end-consumers according to the principles of the CCM agreement. This forces such utilities to sell assets in order to cover operational losses – a situation that is not sustainable. New equity issuance is often no viable alternative as investors are reluctant to buy new shares in junk bond status companies. El Paso credit decline is no exception in the energy industry's history. A similar feat occurred to Williams in 2002 after the ENRON collapse - massive restructuring improved the company's position. CMS Energy today has a similar (BB+) junk bond status for its recent debt paper.

2.6. US incorporated utilities are at competitive disadvantage to non-US incorporated competitors

The credit ratings of EU-incorporated utilities, some of which have entered the US energy utility markets (Eon, Iberdrola, GdF Suez, National Grid), are commonly better than of their US counterparts (Table 6). When such non-US parents hold equity stakes in US subsidiaries, which deliver returns via the WACC of their daughter companies, this provides them with a distinct competitive advantage over US utility parents. The reason is that the cost of the debt capital to acquire equity stakes in their US daughters is by the EU-incorporated parent company financed with A-rated bonds. These A-bonds charge lower interest rates than the return on equity received from the daughter company via the authorized WACC. This provides these EU-based companies with a secure return on investment, based on their cost of financing advantage over US-based companies. The cash flow position of EU-based utilities is traditionally stronger than their US peers, partly because energy regulation in EU countries did not affect the earnings of these companies. However, this has recently started to change, as the business climate has now deteriorated for EU-based utilities. The 2010 lowering of the credit rating of Gasunie of the Netherlands from AAA to AA- was motivated by Moody's as due to the lowering of tariffs at Gasunie's German subsidiary (Gasunie Deutschland) by 7% under pressure of the German regulator (Bundesnetzagentur). Likewise, the creditworthiness of National Grid was lowered to BBB+ in recent years mostly due to high debt gearing related to foreign acquisitions; it held an issuer default A-rating until 2007.

2.7. Inverse relation of risk and reward (Beta values) for utility stocks

Investors expect high risk (volatile) stocks to yield higher return. Beta is a common measure for stock volatility. Company stocks performing with a systematic risk higher than the market have Beta's > 1. The S&P index has Beta $= 1$, and stocks with Beta < 1 have a lower volatility, meaning lower systematic risk than the market; Betas below 1 are 'less risky' than the market. The volatility (Beta) of US energy utility stocks has been traditionally low (Beta < 1) and therefore less risky than the market portfolio (Beta $= 1$). The traditional low volatility of utility stocks still holds for some utility companies (KMP: 0.25; CMS: 0.60; BRK.A: 0.62; NI: 0.78), but has been replaced by high volatility for others (EP: 1.2; WMB: 1.28, Dec 2007 Betas, even prior to the Great Recession). Total shareholder returns for utilities over the period 2002 to 2006 were market conform (Weijermars, 2010a), but the volatility of the stocks has increased and returns have not.

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

Table 5
Example of leverage between capital structure, and authorized ROR, and WACC in the utility industry.

Capital structure	Ratio (%)	Authorized ROR (%)	Authorized Wt. cost capital (%)	Real ROR (%)	Real Wt. cost capital (%)
Debt (Long-term)	46	6.05 (Moody's bond rate)	2.78	12.3 (junk bond rate)	5.66
Preferred Stock	2	5.68	0.11	5.68	0.11
Common Stock	52	10.11 (=ROE)	5.26	10.11 (=ROE)	5.26
Total	100	–	Authorized WACC = 8.15%	–	Real WACC = 11.03%

ROR = Rate of Return; ROE = Return on Equity; WACC = Weighted average Cost of Capital.

2.8. Dedicated pipelines bypass utilities and depress utility earnings

Liberalization of the US natural gas market in the late 20th Century has led to a situation where end-users can build dedicated pipelines in joint ventures with midstream transmission providers, which bypass the LDC tariff zones. The direct contracting of large volume end users with mainline transmission companies became possible after FERC orders 436 (1985) and FERC order 636 (1992). In the US, 60% of the retail gas is delivered through LDCs, and another 40% is bypassed by mainline pipeline systems (Tobin, 2008). The trend is that more and more end-users (mostly power plants) will bypass the LDCs in order to save on tariffs.

2.9. LNG redundancy in oversupplied US gas market, US landing terminals sitting idle

US companies have invested in massive expansion of their LNG receiving terminals, most of which were completed over the past decade. The US had approved LNG capacity plans that could land upto 70 Bcf/d from 2012 onward (Foss, 2007). However, the cost of LNG at world markets became in 2008 higher than US domestically produced natural gas. The 2008 operational US Gulf Coast receiving capacity was 8 Bcf/d and the US East Coast receiving capacity amounted to nearly 5 Bcf/d (DOE-EIA data, 2009). Much of this capacity is now redundant due to the success of the domestic unconventional gas production. As a result, only 7.5% of the available LNG landing capacity was actually used in the US in 2008, which can be inferred from the fact that LNG imports had dwindled to a mere 352 Bcf which equates to daily average LNG landings of 0.96 Bcf/d. In addition, some 14% of the US 2008 LNG importation (i.e. 49 Bcf of the total 352 Bcf imported, DOE data) was re-exported and resold either at a loss or forwarded at net import prices to customers abroad (see DOE-EIA LNG import/export balance sheets, 2009) due to the depressed domestic prices and slowing demand in the 2nd half of 2008. As US storage and working gas design capacity become more rapidly filled by steadily growing domestic production and delayed consumer demand, price-induced shut-ins of LNG terminals have started to occur. The low usage of LNG terminal capacity will depress earnings of those utilities that have invested in LNG re-gasification and landing facilities. Plans for a reversal of LNG terminals have been lead by Cheniere (Brooks, 2012).

Table 6
Credit ratings of major EU-based utility companies (2010).

Company	Home country	Credit rating (S&P)
Gasunie	Netherlands	AA–
EdF	France	A+
GdF Suez(*)	France	A
Iberdrola(*)	Spain	A
Eon(*)	Germany	A
RWE	Germany	A
Dong	Denmark	A–
Endesa	Spain	A–
Enel	Italy	A–
Centrica	UK	A
National Grid(*)	UK	BBB+

(*) Companies with major assets in the US.

2.10. Regulatory uncertainty leads to clockspeed stagnation in natural gas value chain

The regulator controls the US natural gas value chain. Regulatory issues can play an enormous role in the pace-setting for the natural gas transition. The regulatory regime must create a fair play field and speed up decisions to facilitate retail competition with an efficient rate-making process for residential, industrial, commercial and power generation users. The impact of US legislation may lead to fuel switches from pollutive coal to cleaner natural gas and carbon emission cap prices of 12–50 USD per metric ton. The outlook for the US is a sustained and growing dependency on natural gas. Electricity generation was fueled by 18 Bcf/d of natural gas in 2010, a usage that could double by 2020. The anticipated switch toward more natural gas-based power generation over the next two decades requires clockspeed acceleration in the natural gas value chain (Weijermars, 2010a). Rate case settlements between utilities, regulators, and consumer advocacy groups should consider the long-term effect of declining creditworthiness of utilities. The effective implementation of the energy transition envisioned in the US and elsewhere requires clear and expedited lasting regulation that can be relied on for long-term asset investments. Greenhouse-gas emission reductions feature centrally in new regulation policies such as the American Clean Energy and Security Act of 2009. The US Environmental Protection Agency (EPA) announced in 2010 emission regulation for facilities emitting more than 25,000 tonnes of carbondioxide a year (EPA director Lisa Jackson in the Economist, 3 October 2009, p. 61). However, the regulatory implications remain still under discussion.

3. Assessment of natural gas value chain integrity

The US natural gas industry has realized a totalized turnover of 687 billion USD in 2008 (Weijermars, 2010b). Table 7 also specifies where these revenues are generated in the natural gas value chain. The general public's common perception is that high energy prices generate generous profits for energy utilities. This perception is reinforced by the success of the upstream oil & gas companies, which indeed rank among the largest and most profitable corporations in the Fortune Global 500. Oil and gas majors have market capitalizations of several hundred billion USD (Exxon: 304 billion, Shell: 164 billion, Chevron: 159 billion, BP: 151 billion, Conoco: 87 billion, as per May 2010). The typical 20% average profit for most of the decade (return on capital employed) generated by the upstream oil and gas industry (Table 7) rivals the best S&P 500 performers. The oil and gas majors (Exxon, Chevron, Conoco) can fully fund new capital growth projects from operationally earned net cash flow excess (Weijermars, 2010c). An exception is the net cash flow

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

Table 7
US natural gas value chain yields.

	Upstream	Midstream	Downstream
Company types	Exploration & production operators	Interstate transmission pipelines	Local distribution companies
Examples peer group companies	XTO Chesapeake Marathon Hess	El Paso Williams Kinder Morgan MidAmerican	Sempra Nicor Questar Atmos
Total US natural gas revenues 2008: 665 billion USD	194 billion USD	Shippers: 225 billion USD transmission & storage: 22 billion USD	246 billion USD
Earning source	Reservoir development & wellhead price	Wholesale price, storage & transmission tariffs	Retail price & customer services
Business effort	Natural gas lifting	Trading & Transmission	Distribution services
Profits (6 year averages 2002–2007)	20%	2.5–8%	2.5–8%
Typical market cap size of companies	50 billion USD or more	8 to 28 billion USD	1 to 15 billion USD

Revenue compilation details in Weijermars (2010b); Upstream profits (ROCEs) in Weijermars (2010d); Midstream and downstream profits (RONOAs) in Weijermars (2010b).

generated from operations by upstream E&P companies (XTO and Chesapeake) that specialize in the growing segment of non-conventional natural gas extraction, which is insufficient to finance new capital growth projects (Weijermars, 2010c) and therefore are less profitable than the traditional E&P activities of oil and gas companies.

The profit range for the midstream and downstream natural gas segments is much more modest than the profits for the upstream E&P industry. The average profit (return on net operating assets) in the downstream utility segment ranges between 2.5 and 8% (Table 7). In contrast, the upstream segment of the natural gas value chain enjoys an average profit of 20% (Table 7). The market capitalization of the typical and leading mid and downstream energy companies also is significantly smaller than for the typical upstream companies (Table 7). Market capitalization for energy utility companies active in the mid and downstream part of the natural gas value chain range between 8 and 28 billion USD (e.g., El Paso: 8.5 billion, Williams: 13.0 billion, Exelon: 28.1 billion, Sempra: 11.8 billion, ConEdison: 12.6 billion, Duke: 22.3 billion, Spectra: 14.7 billion, as per May 2010). Market values of Local Distribution Companies (LDCs) commonly range between 1 and 15 billion USD (Table 7).

Meanwhile, many US energy utilities cannot cover the cost of capital from the return on capital invested in their company (Table 5). These companies must resort to asset sales to supplement net cash from operations in covering new capital investment projects and shareholder dividend payments. The credit rating status of US utilities has declined over the past decade. The cost of not having A ratings has been exemplified in Table 5, and can raise the cost of capital (WACC) of a company by as much as 3%. The traditional cost of service regulation for utilities (e.g., Crocker and Masten, 1996) mandates provisions of efficient, safe, adequate and reliable energy supply. Utilities are expected to provide adequate service to the end customer, and must now also play a leading role in the energy transition. Energy transition requires innovation, but overly tight regulation of the downstream segment could jeopardize safety and security of the natural gas value chain.

The traditional rate-making has resulted in cash flows from operations for energy utilities that leave no room for capital expenditure in new projects. Instead, new capital projects need to be financed by external funding sources (debt capital, equity capital) or asset sales. Such financing is harder to obtain and at unfavorable interest rates as the declining creditworthiness of utilities increases the cost of debt capital and makes equity capital less attractive due to low dividends. State regulators allow for compensated debt capital for BBB rated and lower rated utilities only up to a level of Moody's Baa utility bond interest rates under the adopted Cost of Capital Mechanism (CCM). Utilities that have a lower rating than BBB pay higher interest rates on their bonds, but cannot pass on the full cost of this higher interest charge in their customer bills. To pay for the differential, BB rated utilities must resort to asset sales to supplement their liquidity position. For example, El Paso and CMS Energy have BB and BB + ratings, respectively (2010 data).

4. Possible solutions to revitalize the downstream US gas value chain

The US natural gas industry has been intensively regulated by US Congress. The rationale and historic necessity of regulation are outlined in Appendix B. Successful regulation philosophies of the past may not necessarily be good for the further optimization of present and future energy needs. Energy policies can either accelerate or delay the optimization of effectiveness in the energy value chain.

Economic vitality of the US energy utilities is essential for catalyzing the clean energy transition. The new energy transition goals require a proactive investment strategy by utilities to meet the national and state targets for energy diversification and environmental footprint reduction. New infrastructures and services must be developed that include carbon-footprint reduction, as well as smart grid investments, and smart metering that help customers to monitor their energy consumption to guide their energy conservation actions. The US Renewable Portfolio Standards (RPS) regulation policy mandates that between 4 and 30% of power generation comes from renewable sources by a specified data. As of March 2009, 33 states adopted the RPS with varying targets and realization dates all before 2025. The RPS provides for a Renewable Energy Credit (REC) trading program in some states (e.g., Texas), which allows utilities to either adopt or defer RPS targets - and compensate the deferral by buying REC credits. The RPS is an example of forced asset diversification at energy utilities. A hands-off approach may be more effective, leaving inter-fuel competition to market forces. In essence, this would mean a return to Friedman market dynamics in the mid- and downstream energy sectors, and a relaxation of Keynesian patronage of utilities.

A new approach would be to re-engineer regulations such as to allow utilities to improve their impoverished business position (Fig. 3). Utilities with strengthened balance sheets and positive cash

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

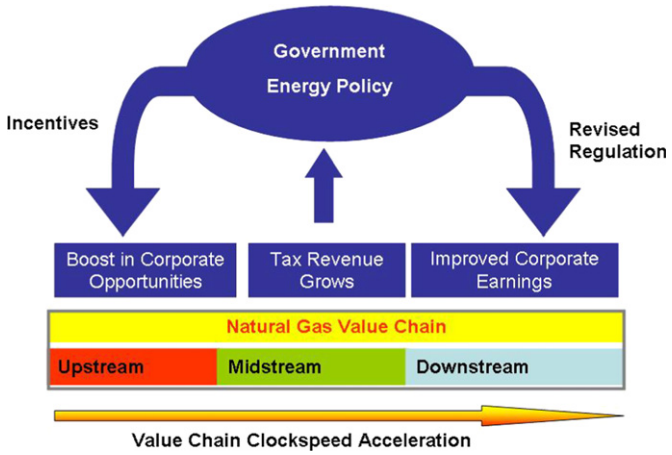


Fig. 3. Revised regulation should aim at speeding up the natural gas value chain and improve corporate earning capacity to enable new investments.

flow from operations can invest in new infrastructure and new technology (smart grids, smart metering). Stronger cash flows would improve the credit ratings of US utilities and reduces their financing costs. The end consumers would benefit from the improved services and long-term success of the energy transition. The state benefits from improved net earnings as taxation remittances will grow beyond the current tax base of 687 billion USD of natural gas value chain revenues (2008 data, Weijermars, 2010b). Improved tax income from utilities benefits the country and its citizens, especially in times when public finance needs to find new cash sources to fight off decline in sovereign T-bill ratings. Sovereign debt has risen in both the US and many EU countries, which has raised the yield on T-bills. Budgetary discipline can bring down these rates. One way of meeting federal budget targets is a reduction of regulatory incentives for energy markets that uses tax payer money to influence inter-fuel competition.

Revised rate-making is required to improve the regulatory horizon of utilities that compete for access to funds from the capital markets. The regulatory framework could allow provisions to enhance the business performance while still meeting regulatory objectives, as follows:

1. Public utility rate case reviews should strive for optimization of the true cost of energy deliveries over the longer term. Upgrade of creditworthiness of utilities benefits consumers, because then investments needed to avoid deceleration of the clean energy transition can be accelerated again. Improving the creditworthiness of US utilities will also up-heave trans-atlantic imbalances in the cost of capital by removing differences in credit ratings. Today BBB and BB ratings dominate the utility industry in the US, while A ratings are still the norm for utilities in Europe. The difference can be attributed to the fact that European utilities operate mostly in monopolistic and incumbent positions, which ensures these companies profitable rate making agreements. In contrast, US utilities have lost profits in their rate-making agreements as the GRC and CCM have tightened the room for making profit, and increased the risk of making a loss with declining credit ratings as a result. Enabling US utilities regain A ratings would mitigate growth of the alleged competitive disadvantage. EU utilities have credit ratings (commonly A+, A, A−; Table 6) that are commonly higher than the ratings of their US competitors (commonly BBB+, BBB, BBB−; Table 4), which means the cost of capital is cheaper for EU companies, providing them with a competitive advantage over US peers. For example, both Iberdrola and Eon are A-rated companies, which have made major acquisitions in the US energy markets. They can raise capital at attractive interest rates for A-rated companies. Rate-making rules should be modified to enable US utilities to recover the full amount of prudently incurred costs. Given the fact that the US puts so much 'energy' and political weight behind security of energy supply it seems incongruous to curtail earning capacity of the utility companies to the extent that their liquidity position is under serious pressure.
2. By law, utilities may not charge more for natural gas deliveries than they pay for the commodity; only distribution assets and services are chargeable. However, they must be allowed to charge rates high enough to recover full cost of current and new infrastructure investments. Fair rates for fossil energy deliveries will encourage consumer's energy conservation efforts. Expansion incentive rate-making would reward companies that develop efforts to meet the clean energy policy goals in the rate-making cases. New projects must be financed, and the capital markets will only do so at favorable rates if the utility's earning potential is clarified by the regulator. Construction work in progress (CWIP) inclusion in the rate base and quick pre-approvals of the project investments are essential for successful fund-raising in competitive capital markets in search of investments with secure returns. This may be particularly relevant for replacing aging nuclear and coal power plants by gas-fired power plants. The same holds true for building LNG export terminals. More competitive energy pricing will also enable the removal of subsidies on alternatives.
3. GRC rate making should allow a more realistic cost recovery of the true WACC (see Table 5). This requires a higher equity ratio to bring down the financing cost. Credit ratings must be restored to achieve better ROE for equity capital and realistic rates of return on debt capital, especially for companies rated lower than BBB that pay interest rates on bonds that are higher than the authorized cost of debt capital. Any differential in regulatory rate approval and the utilities cost of debt paper will be impacting the customer bills for a long period as creditworthiness of the utility will decline further if income cannot be raised while financing costs increase. A reversal is needed and that requires recovery of true WACC under the CCM so that utilities can sustain their energy services without a further decline in their liquidity positions.

5. Implications for Europe

The suggestions made here for amendments to the US rate-making system also could be taken into account in on-going efforts to further harmonize the EU regulatory framework. Rate-making rules by national regulators within Europe vary from country to country. Regulations early aim was to prevent monopolistic infrastructures from charging excessively high prices. With the unification of Europe, market liquidity and security of supply came to the forefront in the EU's energy policy agenda. In Europe, the two primary aims of the EU directives (1st gas directive "Regulation for an internal natural gas market" of 1998/30/EC and 2nd Amended gas directive "acceleration directive" of 2003/55/EC) for natural gas regulation still are: (1) bringing in more competition by creating real liquidity in the natural gas market to ensure best pricing for the commodity, and (2) ensuring security of supply. The so-called 3rd EU legislative package of April 2009 provides specific regulation for the development of an integrated

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

European Network of Transmission System Operators (ENTSO; ENTSO-G for gas and ENTSO-E for electricity), concurrent with the creation of ACER (Agency for Cooperation of Energy Regulators).

But the diversity in the EU regulatory earning models makes it complex for TSOs to integrate cross-border transmission networks. An international TSO operating in various EU countries must negotiate with each national regulator, whereby the rate-making framework and systemics vary from country to country. This pluriform rate-making landscape is a formidable impediment to foster an efficient gas transmission network with optimum liquidity and security of supply. Striving for common ground rules on rate-making for natural gas transmission networks in different European member state has the following advantage: an uniform approach in setting transmission tariffs means that all countries can bring natural gas to the entry point at interstate border-crossings into adjacent jurisdictions at fair and similar transmission rates. Differences between rate-making frameworks are diminished when common guidelines emerge. The development of such common guidelines could be very constructive on one hand to streamline the EU objective to form an integrated pan-European TSO (ENTSO) and on the other hand improve cooperation between the European energy regulators (ACER). Harmonization of the *rate-making methodologies* and *regulation rules* in EU member states are essential. Only then can the ultimate aim of optimum market liquidity and optimum security of supply be successfully achieved.

6. Conclusions

The following recommendations are formulated:

1. True cost of capital should be allowed in rate cases under the GRC and CMM. This may include a temporary provision to raise the authorized ROR on debt capital beyond that of Moody's generic Baa utility bond rate if the company's actual creditworthiness is lower than Baa.
2. Construction work in progress (CWIP) inclusion in the rate base and quick pre-approvals of new project investments are essential for successful fund-raising in competitive capital markets in search of investments with secure returns.
3. The GRC and CMM should allow for lower debt to equity ratios (now generally higher than 50%), which would reduce financing costs for the utility industry.

These three recommendation made above can help revitalize energy utilities in the US, as key pillars of the energy transition program. US utilities can sustain their current natural gas deliveries, and fund growth, as strategically required for the clean energy transition.

Acknowledgments

This study has not been funded by any stakeholder party, which means that the analysis presented is free from any political bias and purely based on rational arguments.

Appendix A. Capital markets and credit ratings

The creditworthiness of the Midstream natural gas industry has also been inventoried here. Table A1 shows the 2010 (Q1) credit ratings for the 10 major US interstate natural gas transmission providers with the highest interstate pipeline mileage and volume throughput. The inventory of the Midstream natural gas segment of Table A1 further shows that the major companies (El Paso, CMS Energy) are junk bond rated, two companies have BBB- rating (Williams and NiSource), two companies have BBB ratings (Kinder Morgan and Boardwalk), and four companies have BBB + ratings (Spectra, MidAmerican, Dominion, and PG&E). Some energy companies are mainly active in the natural gas transmission segment (EP, WMB, KMP, BWP), others focus on integrated transmission and distribution of natural gas (SE). Noteworthy, the top transmission companies (EP, SE and WMB) with 1/3rd of the total US interstate pipeline mileage account for 56% of the annual volume throughput. Other transmission companies have a major LDC focus with combined electric and natural gas distribution services (MidAmerican, Ni, CMS, PCG, D). There is no systematic difference in creditworthiness of electricity utilities and natural gas utilities. The credit situation of the electric utility industry (with major players like Exelon, Duke, Reliance, and Questar) was recently analyzed by Olson (2009), who also concluded a significant decline in creditworthiness for US electricity utilities.

The BBB + credit rating of Sempra Energy, is partly supported by the 51% ownership by the Royal Bank of Schotland (RBS), which acquired the equity stake in 2007. The joint venture is held in a holding company RBS Sempra Commodities (RSC), with the aim to positively alter Sempra's risk profile by removing the liquidity, capital, and credit support requirements of Sempra's commodity trading business from the company's balance sheet, because RBS will fully guarantee all of these obligations. Furthermore, the terms of the RSC partnership agreement allow Sempra to earn a 15% preferred return on its $1.3 billion initial equity investment, followed by a sharing mechanism that entitles Sempra to retain 70% of the joint venture's first $500 million in after-tax earnings and 30% of all earnings thereafter. This earnings structure is aimed at dampening the cash flow volatility associated with the commodities business by converting lower-quality earnings that reflect mark-to-market gains and losses into annuity-like cash distributions.

Table A1
Top 10 Major US Interstate Gas Transmission Companies

Transmission company	2007 Miles interstate pipeline	Percent of US total mileage	Actual annual through-put (Tcf)	Percent of US total through-put	2007 Storage capacity (Bcf)	2010 Credit Rating (S&P)	NYSE symbol
El Paso Corporation	42,000	15%	6.4	28%	230	BB	EP
Spectra Energy Company	18,000	6.5%	3.6	16%	265	BBB+	SE
Williams Energy Services	15,000	5.4%	2.7	12%	216	BBB−	WMB
MidAmerican Energy Holdings	16,900	6%	1.9	8.5%	73	BBB+	BRK.A (*)
NiSource Incorporated	16,000	5.8%	1.6	7.2%	637	BBB−	NI
Kinder Morgan Energy Partners	8,700	3.1%	1.6	7%	400	BBB	KMP
Dominion Resources Incorporated	7,800	2.8%	0.7	3.2%	975	BBB+	D
CMS Energy	1669 partly intrastate	0.6%	0.2	1%	143	BB+	CMS
Pacific Gas & Electricity Corporation	6136 partly intrastate	2.2%	1.1	5%	47	BBB+	PCG 'PG & E'
Boardwalk	14,000 (includes laterals)	5%	1.8	7.7%	160	BBB	BWP
Totals	146,205	52.2%	21.7	95%	3.15 Tcf		
US Totals	278,000	100%	22.8	100%	4.2 Tcf		

(*) Privately held in Berkshire Hathaway. Volumes from Weijermars (2010a) and ratings from Standard & Poor's and company annual reports.

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003

Appendix B. Regulation objectives and security of supply

Regulation is globally needed in the energy utility industry, because the monopolistic/oligopolistic nature of such services would give a single local utility or limited group of utilities uncontrolled power over the end-consumer (Levy and Spiller, 1996). For the energy utilities and interconnected transmission providers in liberalized markets, a regulatory regime is commonly designed to set adequate guidelines for prudent rate-making and to ensure reliable quality of service, including security of supply (see Textbox 1). An energy utility is an organization that maintains an energy infrastructure and provides services to the general public – it may be publicly or privately owned. Other public utilities include telephone, water, and television cable systems, as well as streetcar and bus lines, and all are commonly regulated by state, county and/or city public utility commissions under state laws.

Textbox 1

Rules and regulations for the utility industry commonly ensure and foster that:

1. Security of supply is optimized; in the US predominantly a Federal concern directed by FERC Orders, and in EU increasingly stimulated by EU directives.
2. Liquidity in energy markets is created to achieve best price for commodity. Ultimately, consumer gas and electricity bills are determined by pricing for the energy commodity in a growth market and availability of sufficient volume to create boundary conditions where transmission assets can make a return on investment.
3. Guidelines are provided for rate-making that is 'just and reasonable' for all parties involved. This is the basis of the recurrent negotiation process between the regulator and the transmission company to achieve an agreement on the rate-setting.
4. Quality of service is adequate.
5. Incentives are set for special programs, socialized if need be to move forward on innovations like CCS infrastructure, RPS, smart grids, smart metering and energy conservation programs to reduce our environmental footprint.

Ensuring security of supply and encouraging the development of competitive markets are themes that have been center-stage on the world's political energy agendas for several decades. Green energy initiatives are now also competing for attention on policy agenda's, often in favor of renewables such as wind and solar energy resources. The switching between the various fossil fuels (coal, oil, or gas) and alternatives (solar power, wind power, geothermal power, tidal power, hydropower, nuclear power) is not purely a consumer choice. The use and development of alternative energy sources are stimulated by additional rules and regulations. The total package of energy policies provides a framework to execute a country's energy strategy plan.

The term security of supply has featured center-stage in energy policy reports for decades. Security of supply encompasses the following objectives:

- Long-term ability to bring in new gas volumes through competitive midstream network extensions that connect (new) supply sources with existing demand regions.
- Long-term ability to serve locally emerging distribution capacity of new demand regions, or additional growth in existing demand regions, through competitive downward network connections.
- Continual ability to maintain integrity of aging assets when rate-making for regulated returns on investment is under pressure.
- Short-term ability to balance physical volume of demand and supply through peak cycles by having sufficient storage capacity, compressor, contract and transmission flexibility.

References

Brooks, A., 2012. Optimistic NPC Report could Point US Energy Strategy in Wrong Direction. Energy Strategy Reviews vol. 1, number 1, in press.

Crocker, K.J., Masten, S.E., 1996. Regulation and administered contracts revisited: lessons from transaction-cost economics for public utility regulation. Journal of Regulatory Economics 9, 5–39.

Foss, M.M., 2007. United States Natural Gas Prices to 2015, vol. 18. Oxford Institute of Energy Studies, NG, p. 36.

Jaccard, M., 2005. Sustainable Fossil Fuels. CambridgeUniversity Press, p. 381.

Kramer, G.J., Haigh, M., 2009. No quick switch to low-carbon energy. Nature 462, 568–569.

Levy, B., Spiller, P.T., 1996. Regulations, Institutions, and Commitment. CambridgeUniversity Press.

Olson, W.P., 2009. At a cross roads: modernizing utility infrastructure in a though credit environment. The Electricity Journal 22 (7), 6–26.

Sylla, R., 2002. A historical primer on the business of credit ratings" presented at 2001 world Bank conference in Washington DC (March 1–2) on "The role of credit reporting systems in the International Economy. published. In: Levich, R.M., Majnoni, G., Reinhart, C. (Eds.), Ratings, Rating Agencies, and the Global Financial System. Kluwer, Boston, pp. 19–40.

Tobin, J., 2008. Distribution of Natural Gas: The Final Step in the Transmission Process. Energy Information Administration, Office of Oil and Gas. June 2008.

Weijermars, R., 2010a. Guidelines for clockspeed acceleration in the US natural gas transmission industry. Applied Energy 87, 2455–2466.

Weijermars, R., 2010b. Value chain analysis of the natural gas industry – Lessons from the US regulatory success and opportunities for Europe. Natural Gas Science and Engineering 2, 86–104. 1875–5100.

Weijermars, R., 2010c. Bigger Is Better when It Comes to Capital Markets and Oil Liquidity, vol. 28. First Break, June Issue, pp. 5–9.

Weijermars, R., 2010d. Tracking the Impact of Recession on Oil Industry Supermajors and Timing of Sustained Recovery, vol. 28. First Break, January Issue, pp. 33–39.

Weijermars, R., 2011. Credit ratings and cash flow analysis of oil & gas companies: competitive disadvantage in financing costs for smaller companies in tight capital markets. SPE Economics & Management 3 (2), 54–67 (SPE 144489).

Please cite this article in press as: Weijermars, R., Regulatory reform options to revitalize the US natural gas value chain, Utilities Policy (2012), doi:10.1016/j.jup.2011.12.003