Press Release

Usha Haley: How Chinese Investment in US Shale Gas Impacted Green-Technology Development

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WICHITA, Kan., Feb. 5, 2024 /PRNewswire/ -- The USA is the foremost producer of shale gas, boasting cutting-edge technology in the field. Meanwhile, China, the world's largest energy consumer, has strategically set its sights on shale gas, but lacks a competitive technological edge. To bridge this gap, China has embarked on investments in US shale-gas producers, refiners, and distributors, including small and medium-sized enterprises (SMEs) that have spearheaded energy exploration and technology development. How has Chinese investment affected US technology development? Usha Haley, Barton Distinguished Chair, Wichita State University, and principal investigator, provided answers through her National Science Foundation funded research on "Technology Development, Strategic Risk and National Policy: The Impact of Chinese State-Capitalist Investments in US Shale Gas".

Haley focused on environmentally-friendly ("green") technology in US shale gas, impacts on US SMEs' pioneering energy exploration, and implications for US national security, including energy self-sufficiency and technology leadership.

The results uncover statistically significant shifts in technology ownership and innovation, with China dominating green-patenting activity, and Chinese investors increasingly dictating trajectories of green-technology development in US shale gas. Data included interviews with Chinese and US managers, site visits, surveys, green patents, greenhouse gasses, federal regulation, company statistics, and industry operations. The methodology involved comprehensive statistical analysis of upstream, midstream, and downstream sectors of US shale gas, comparing data from pre-Chinese (2000-2008) and post-Chinese (2009-2018) investment periods.

subsidized US production using established technology, thereby disrupting technology development crucial for US national security, trade, employment, and environmental protection. Chinese investments have negatively impacted technology trajectories, and reduced patenting activities by US SMEs. Chinese investments have also altered the dominance of green-patent areas, and shifted filing proportions overwhelmingly in China's favor and for China's geological terrain, particularly in upstream and midstream applications. Post-2009, increases in Chinese patents vis-à-vis the USA's, appeared in water consumption, search efficiency, reducing water waste, water-table purity, and seal maintenance."

Haley also explored changes in patents filed and federal regulations in related sectors such as oil and gas extraction, petroleum and coal-product manufacturing, chemical manufacturing, and pipeline transportation. After Chinese investments, significant increases in regulatory protections between 2001 and 2019 failed to impact natural-gas emissions. Contrary to a 2019 Council of Economic Advisors' report, her research found that the shale revolution did not decrease greenhouse gas emissions, as patents remain underutilized domestically.

She found that managerial perceptions diverged: most believed Chinese investment spurs innovation in the shale-gas sector, but also that it primarily benefits China. Interestingly, most mistakenly perceived the USA as leading shale-gas innovation in green technology, despite overwhelming evidence indicating China's dominance.

China's emergence as the dominant player in green-technology patents has implications for US competitiveness, energy self-sufficiency and technology leadership. As China strategically leverages its state-backed investments to reshape technology landscapes, US policymakers face challenges of balancing economic interests with national-security concerns.

Regulations have increased over time, particularly in emission-intensive sectors, yet impacts on Chinese investments remain negligible. Despite efforts to curb emissions, the shale-gas sector continues to face scrutiny over its environmental footprint, underscoring needs for comprehensive policy frameworks that reconcile economic development with environmental sustainability.

Haley identified the findings as challenging assumptions regarding environmental benefits of shale-gas innovation, and revealing disconnects between patent activity and real-world emission reductions. This discrepancy underscores the importance of translating innovation into tangible environmental outcomes and the need for evidence-based policymaking.

Haley emphasized that as the US and China navigate evolving geopolitical tensions, understanding the implications of foreign investment in critical sectors such as shale gas becomes paramount for safeguarding national interests and technological leadership while promoting sustainable development.

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