*Iranian Studies* (2025), 1–17
doi:10.1017/irn.2024.31

ARTICLE

# A Firm Policy Decision: Infrastructural Form and Pahlavi Developmentalism at the Ahvāz Pipe Mill

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(Received 16 May 2024; revised 30 July 2024; accepted 8 August 2024)

## Abstract

By examining the history of the Ahvāz pipe mill in the 1960s and 1970s, this article investigates the manner in which competing understandings of Iran's modernizing trajectory among Pahlavi officials were bound up with the material aspects of steel, such as weight, volume, and form. The mill was built to provide pipe for the First Iran Gas Trunkline, a sprawling system intended to gather, refine, and transport natural gas to Iranian cities and the Soviet Caucasus. Officials overseeing the project debated whether the mill's design should prioritize serving the pipeline project or, more ambitiously, establish a new pipe rolling industry able to serve domestic and regional markets. Argued in this article is the significance of attending to infrastructure and materiality in understanding Iran's twentieth-century history of developmentalism.

**Keywords:** IGAT-1; industrial development; infrastructure; Iran; materiality

Speaking in late 1967 at the inaugural ceremony for a new factory on the outskirts of Ahvāz, Manuchehr Eqbāl, chairman of the National Iranian Oil Company (NIOC), hailed the construction of Iran's first facility dedicated to the production of steel pipe, declaring that all those before him were "overwhelmed with pride" at bringing the project to a successful conclusion.[1] Although there is no record of how any of those present truly felt about their efforts, the chairman's attendance pointed to its importance to NIOC and the Iranian government. Far from a standalone undertaking, the pipe mill at Ahvāz was a constituent piece of the First Iran Gas Trunkline (IGAT-1) project, a developmentalist initiative that had quickly become one of Pahlavi Iran's most visible. An enormous and complex infrastructural program that brought together government ministries, Iran's national oil and gas companies, consortium firms working in the country's southern oil fields, engineering consultants, and foreign construction firms, IGAT-1 was aimed at both bringing natural gas northward to Iranian cities and facilitating its export to the Soviet Union. The pipe mill was to be one the foundational blocks of that enterprise, supplying the vast quantities of large- and small-diameter pipe needed for gathering, refining, transporting, and distributing gas. But beyond its utility to IGAT-1, the mill also was an expression of a broader modernizing ambition that animated much of Iranian policymaking in the 1960s and 1970s. Indeed, in the minds of some influential state officials, the factory was an opportunity to

[1] "Bayāt-e Jenāb Āqā-ye Doktor Eqbāl," (1346/1967-68), 44.

simultaneously supply a burgeoning domestic need for welded steel pipe and establish a profitable new industry capable of competing in global markets. There was, however, little consensus regarding which goal should be prioritized—a dispute that was, as this article argues, shaped not just by the question of political economy, but also by the materiality of steel and the physical form of pipes.

The allied but not identical aims of supporting the IGAT-1 pipeline project and fostering the creation of a new export industry each pointed toward a production facility of different size and scope. That conflict pulled the pipe mill project in subtly different directions, and Iranian officials expended considerable effort navigating the discrepancy as they debated the mill's place within the state's broader orientation toward modernizing industrialization. Focusing on the tension between the specific needs of the IGAT-1 program and the larger industrializing goals that Iranian officials hoped to achieve, in this article I study the contours of Pahlavi developmentalism in the context of the pipe mill at Ahvāz. This approach allows us to trace an example of high-level policy choices being translated into the construction of real facilities in 1960s-era Iran. Moreover, it opens the door to understanding how such decisions were shaped by the material properties of the infrastructure itself. This is not, however, an assertion of the overriding salience of materiality in this history, as the linked issues of monarchical legitimacy and economic growth underpinned both IGAT-1 and industrialization more broadly. Concerned by the ascendence of democratic norms around the world as well as the shah's brush with ruin in the early 1950s, the decades after the Second World War saw Iran's burgeoning administrative state adopt an increasingly developmentalist orientation as officials sought new strategies of legitimation centered on material prosperity and improved living standards.[2] Cyrus Schayegh called this strategy a "politics of material promise" for its rooting in the provision of consumer goods and new infrastructural services, and it served as a key pillar of Pahlavi governance through the early 1960s.[3] Such policies were built on oil revenues, and as those rose there was concomitant increase in the state's developmentalist (and authoritarian) impulses.[4] By the beginning of the 1970s, the shah's ambitions had grown further still, encompassing not just the preservation of his own rule but also the potential of Iran becoming both a regional power and a leader in the developing world more broadly—an aspiration furthered by the country's generally strong relations with the United States.[5] This purported third way, a "syncretic, distinctly Iranian development model," which was expressed in the aesthetics of Iran's imperial past and neither fully (capitalist) Western nor (communist) Eastern, claimed to bring together a "mixed market-state economy, an industrious workforce, burgeoning welfare, and some human rights, though not political democracy."[6] Despite its overarching vision of broadly transforming Iranian society, Muhammad Rezā Shāh's so-called tamaddon-e bozorg (Great Civilization) was first and foremost built on the prospect of industrialization and rapid economic growth. Indeed, between 1963 and 1976, Iran's GDP per capita was one of the fastest growing in the world, reaching approximately 8 percent per capita per annum.[7] Both the Ahvāz pipe mill and IGAT-1 were part of that push, promising

[2] Ali M. Ansari, "The Myth of the White Revolution: Mohammad Reza Shah, 'Modernization' and the Consolidation of Power," *Middle Eastern Studies* 37, no. 3 (2001), 124.

[3] Cyrus Schayegh, "Iran's Karaj Dam Affair: Emerging Mass Consumerism, the Politics of Promise, and the Cold War in the Third World," *Comparative Studies in History and Society* 54, no. 3 (2012), 626.

[4] Gregory Brew, *Petroleum and Progress in Iran: Oil, Development, and the Cold War* (Cambridge: Cambridge University Press, 2022).

[5] Roham Alvandi, *Nixon, Kissinger, and the Shah: The United States and Iran in the Cold War* (Oxford: Oxford University Press, 2014).

[6] Cyrus Schayegh, "Iran's Global Long 1970s: An Empire Project, Civilisational Developmentalism, and the Crisis of the Global North," in *The Age of Aryamehr: Late Pahlavi Iran and its Global Entanglements*, ed. Roham Alvandi (London: Gingko Press, 2018), 267.

[7] Hadi Salehi Esfahani and M. Hashem Pesaran, "The Iranian Economy in the Twentieth Century: A Global Perspective," *Iranian Studies*, 42, no. 2 (2009), 189.

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

cheap energy for Iranian cities, the revenues of a new industry, and less dependence on imports.

Embodying the modernizing aspirations of Pahlavi policies, the Ahvāz pipe mill and the pipeline project of which it was part were as much political as they were technical and commercial. In this they were not unique. Around the world, infrastructures, particularly those supporting transportation and energy transmission, have been important avenues for the expansion of state power across space and deeper into people's lives.[8] This had long been true in Iran, as even before the advent of development planning in the late 1940s the construction of roads and railways was a crucial avenue for the centralization of power under Rezā Shah.[9] This layering of meaning is a critical feature of infrastructure's social influence, because the political implications of infrastructural systems can (and often do) extend well beyond their technical function and the services they provide.[10] Building upon these insights, in this article I excavate the multiple meanings embedded in the Ahvāz pipe mill, using the factory as a lens through which to examine the competing policy streams that shaped Iranian infrastructural projects in the 1960s. I argue that those disparate meanings were co-constituted with material factors like the weight of steel, the volumetric requirements of transporting pipe, and the potential carrying capacity of the IGAT-1 pipeline. What little has been written on the mill has subsumed its story entirely into larger accounts of IGAT-1 and Iran's natural gas industry, offering little more than brief descriptions of the program's size, cost, and productive output.[11] But the Ahvāz pipe mill's close connection to the gas pipeline meant that its significance extended well beyond the confines of the factory grounds. Although a full accounting of the IGAT-1 program is beyond the scope of this analysis, that broader import nonetheless positions the mill as a productive means for illustrating how development plans, financial priorities, technical limits, and materiality were connected in the long process of Pahlavi industrialization.

Official debates on the Ahvāz pipe mill were largely articulated in technical and financial terms, a cloaking of what were fundamentally political choices with seemingly neutral decisions about the plant's design, construction, and financing.[12] At root was a question of how the potential futures promised by IGAT-1—those of cheap energy and the creation of new industries—should be prioritized. Despite Manuchehr Eqbāl's exuberant words at the pipe mill's unveiling, the choice to produce pipes for IGAT-1 domestically rather than import them had been a contested one. Underpinning the decision to the build the mill was steel's material form and the fact that the "cost of transporting pipes in the form of steel sheets" was substantially less than moving fully formed steel pipes themselves.[13] Focusing on infrastructure and political form as a forum in which citizen–state relations are defined, Brian Larkin has pushed us to attend to the "relation between infrastructure and political

[8] Christopher F. Jones, *Routes of Power: Energy and Modern America* (Cambridge, MA: Harvard University Press, 2014); Penny Harvey and Hannah Knox, *Roads: An Anthropology of Infrastructure and Expertise* (Ithaca, NY: Cornell University Press, 2015); Toby Craig Jones, *Desert Kingdom: How Oil and Water Forged Modern Saudi Arabia* (Cambridge, MA: Harvard University Press, 2010); David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: W.W. Norton & Company, 2006); James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998).

[9] Patrick Clawson, "Knitting Iran Together: The Land Transport Revolution," *Iranian Studies* 26, no. 3-4 (1993), 235–50; Ervand Abrahamian, *A History of Modern Iran* (Cambridge: Cambridge University Press, 2008), 92–93.

[10] Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42 (2013), 335–36.

[11] Husayn Mahbubi Ardekani, *Tārikh-e Moassesāt-e Tamaddoni-ye Jadid dar Iran*, vol. 3, 2nd ed. (Tehran: Enteshārāt-e Dāneshgāh-e Tehran, 1376), 319–25; Pirooz Ashraf, "Natural Gas Industry In Iran," *Encyclopædia Iranica*, online edition, 2016, available at http://www.iranicaonline.org/articles/natural-gas-industry-in-iran (accessed 25 July 2024).

[12] James Ferguson, *The Anti-Politics Machine: "Development," Depoliticization, and Bureaucratic Power in Lesotho* (Cambridge: Cambridge University Press, 1990).

[13] "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1350/1970-71), 6.

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aesthetics" by arguing that such systems (and their material characteristics) are an important means by which promises about the future are both articulated and enacted.[14] This paper extends that intervention by exploring how material factors and forms reflected competing notions of development among Iranian officials, disagreements that ultimately resulted in the decision to build a pipe mill at Ahvāz over the strenuous objections of their hired consultants. The argument is not that materiality was the sole determining factor in the history of the pipe mill, but that it played an integral role in shaping the mill project's final outcome as well as its political and economic significance within Iran. What is presented here is therefore not a question of natural limitations and a triumphalist account of human ingenuity in overcoming them. Nor is it an assertion of material or technological determinism in the history of Pahlavi Iran. It is instead an exploration of possibility and how different understandings of development were expressed in material form—a co-constitution that sheds light on the different conceptualizations of an industrialized future that structured the work of Iranian officials in the 1960s.

## Iranian Developmentalism and the Material Turn

In their work on the Ahvāz pipe mill, Pahlavi officials rarely focused on the materiality of steel and pipe directly, prioritizing instead the terms of commercial contracts and their own developmentalist ambitions. The collection of records that forms the basis of this article is thus centered on these topics. Studying the role of materiality requires reading the available archival sources "against the grain" to tease out how physical factors like weight and volume were connected to the IGAT-1 program's overall financing and timeline and thereby underpinned the decision to build a pipe mill. Despite officials' focus elsewhere, material factors were influential points around which debates on the mill and its overall purpose turned, and it is not possible to fully understand why the facility was built without tracing their significance. Timothy Mitchell has demonstrated the explanatory power of paying heed to nonhuman influences in the history of the Middle East, a viewpoint that builds largely on the work of Bruno Latour and Michel Callon.[15] Latour and Callon have argued for taking seriously the influence of nonhumans in the production of human social worlds, ascribing to them an analytical agency previously reserved for people and their organizations.[16] Formulated through their studies of scientific practice and the creation of technological systems, their approach argues for a generalized causal symmetry between human and nonhuman agents, with social phenomena arising from the relational webs that bring together disparate factors. Other scholars object to such strong analytical symmetry, with some advocating for understandings that see nonhuman agency as subordinate to that of people.[17] This paper draws inspiration from Jane Bennett's ideas of the more-than-human assemblage, a notion that emphasizes the relational networks linking human and material factors without presuming either their causal equivalency (as Latour and Callon do) or the stability of those relationships in time and space.[18] Taking such a flexible approach enables analysis of material factors without assuming their relative importance in advance, and it allows us to be sensitive not only to the role of steel in the history of the Ahvāz pipe mill but also the fact that its different physical characteristics—weight and form—had overlapping but nonetheless distinct effects.

[14] Brian Larkin, "Promising Forms: The Political Aesthetics of Infrastructure," in *The Promise of Infrastructure*, ed. Nikhil Anand, Akhil Gupta, and Hannah Appel, (Durham, NC: Duke University Press, 2018), 175–202.

[15] Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002). See also Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2011).

[16] Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1988); Bruno Latour, *Aramis, or the Love of Technology*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1996).

[17] Andrew Pickering, *The Mangle of Practice: Time, Agency, and Science* (Chicago: University of Chicago Press, 1995).

[18] Jane Bennett, "The Agency of Assemblages and the North American Blackout," *Public Culture* 17, no. 3 (2005), 445–65.

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Highlighting the role of the material holds the potential for more fully understanding how the Pahlavi state's developmentalist impulses were translated into new policies in the decades after the Second World War. That modernizing orientation became a crucial organizing principle for the Pahlavi state in the 1950s, something that reflected both the shah's need for new forms of legitimacy as well as the appearance of a new class of government officials trained in the United States and steeped in the tenets of modernization theory.[19] As Iranian leaders sought the widespread transformation of Iranian society through programs of industrialization, land reform, and education, those currents came into full flower during the White Revolution, a series of top-down developmental initiatives first introduced in 1963. Designed in part to forestall a feared communist revolution through improved living standards, the White Revolution was further aimed at jump-starting the creation of new industries and aggressively moving Iran's economy away from its agrarian roots. Accompanying the White Revolution was the Third Development Plan, one in a series of programs designed to govern the country's drive for development. Although these programs were originally conceived to shift focus away from the creation of state-run industries and large-scale, capital-intensive projects in favor of private enterprise, in practice enormous state-owned infrastructure projects continued to dominate government spending under the Third Development Plan.[20]

IGAT-1 and the pipe mill at Ahvāz sat squarely within that paradigm. But there also was a longer history of resource nationalism underpinning Iran's natural gas projects. IGAT-1 and the pipe mill were possible only because Iranian officials had spent decades working to exploit the country's natural gas resources over the opposition of British Petroleum. Founded in the wake of the discovery of oil at Masjid-e Sulaymān in 1908, British Petroleum had largely controlled and operated Iran's oil industry in the half century since. To maintain its position the company relied on carefully articulated networks of technical work, scientific expertise, and information management, practices that channeled fraught political and concessionary questions—the role of Iranians in the industry; how much oil, how quickly; royalty payments—into opaque and seemingly neutral technoscientific practices.[21] The company's control was not absolute, however, a fact resting on the inherent heterogeneity, unpredictability, and uncontrollability of petroleum pools and the underground geographies within which they existed. In the 1960s and after, these conditions could and did give direct rise to new developmental initiatives by the Pahlavi state.[22] At the same time, with anticolonial sentiments sweeping across the world, Iranian officials were part of international efforts by the developing world to claw back economic power from wealthy and industrialized countries.[23] Within Iran that orientation toward economic nationalism was channeled into politically legitimating celebrations of development and the construction of new infrastructures like IGAT-1. The promise of a prosperous future was expressed through infrastructure projects as they simultaneously enabled and symbolized the Pahlavi state's modernizing transformations. It was in this context that the Ahvāz pipe mill had political meaning adhere to it. More than a straightforward way of supporting the pipeline project, the mill also represented in material form the modern future it was promised infrastructure would bring.

[19] Ramin Nassehi, "Domesticating Cold War Economic Ideas: The Rise of Iranian Developmentalism in the 1950s and 1960s," in *The Age of Aryamehr: Late Pahlavi Iran and its Global Entanglements*, ed. Roham Alvandi (London: Gingko Press, 2018), 35–69.

[20] Kamran Mofid, *Development Planning in Iran: From Monarchy to Islamic Republic* (Cambridgeshire, UK: Middle East and North Africa Press, 1987), 57–9.

[21] Katayoun Shafiee, *Machineries of Oil: An Infrastructural History of BP in Iran* (Cambridge, MA: MIT Press, 2018).

[22] Ciruce Movahedi-Lankarani, "Precarious Petroleum: Volatile Reservoirs, Varied Natural Gas Compositions, and Development in 1960s Iran," *Comparative Studies of South Asia, Africa and the Middle East* 44, no. 1 (2024), 3–17.

[23] Christopher R.W. Dietrich, *Oil Revolution: Anticolonial Elites, Sovereign Rights, and the Economic Culture of Decolonization* (Cambridge: Cambridge University Press, 2017).

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

By tracing the role of material factors in the story of the Ahvāz pipe mill, this article is part of a broader turn away from seeing Iranian society as a passive object subject to the top-down processes of state-directed modernization; it instead emphasizes the role of bottom-up forces and interests, whether they be human or material.[24] By doing so, it builds upon recent studies that have begun to explore the influence of new technologies and infrastructural projects during the reigns of the Pahlavi shahs.[25] These works frame development as a product of people's everyday experiences as much as something promulgated by state officials, even in the case of national projects like the Trans-Iranian Railway. In contrast, most literature on twentieth-century Iranian modernization has emphasized the role of the state, particularly with reference to oil revenues, the rise of centralized economic planning, and the shah's own ambitions.[26] Pushed to the fore in these narratives are powerful government officials and their relationships with Muhammad Rezā Shah; foreign officials, businessmen, and consultants; and each other. This emphasis on the role of influential individuals is furthered by the outpouring of memoirs from leading figures in Iran's government and petroleum sector, works that often give significant weight to the biographies and shifting political fortunes of prominent figures.[27] These are frequently narratives of engineering and managerial triumph that reproduce state-centered claims that were widely articulated in public relations material from the era.[28] To be sure, these accounts are valuable resources for understanding the inner workings of the Pahlavi state, especially vis-à-vis interministerial tensions, competing financial priorities, international relations, and the role of consulting experts in the creation of Iran's petroleum sector and the IGAT-1 program. The focus on materiality in this article is not a substitution for the concerns these narratives prioritize; rather, it is an expansion of the histories they present through the highlighting of material factors. It is an effort to more fully understand how and why Pahlavi officials made the choices they did with regard to the country's industrialization. Further, I investigate how their decisions were shaped by material properties, not as limits or challenges to be heroically surmounted, but as factors contributing to the range of options they considered.

[24] Cyrus Schayegh, "'Seeing Like a State': An Essay on the Historiography of Modern Iran," *International Journal of Middle East Studies* 42, no. 1 (2010), 37–61.

[25] Mikiya Koyagi, *Iran in Motion: Mobility, Space, and the Trans-Iranian Railway* (Stanford, CA: Stanford University Press, 2021); Mikiya Koyagi, "Pedalling in Pahlavi Iran: Cycle Mobility and Competing Masculinities," *The Journal of Transport History* 45, no. 1 (2024): 41–61.

[26] H. Mahdavy, "The Patterns and Problems of Economic Development in Rentier States: The Case of Iran," in *Studies in the Economic History of the Middle East*, ed. M.A. Cook, 428–67 (London: Routledge, 1970); Ervand Abrahamian, *Iran: Between Two Revolutions* (Princeton: Princeton University Press, 1982); Eric J. Hooglund, *Land and Revolution in Iran, 1960-1980* (Austin, TX: University of Texas Press, 1982); Hossein Razavi and Firouz Vakil, *The Political Environment of Economic Planning in Iran, 1971-1983: From Monarchy to Islamic Republic* (Boulder, CO: Westview Press, 1984); Mofid, *Development*; Afsaneh Najmabadi, *Land Reform and Social Change in Iran* (Salt Lake City: University of Utah Press, 1987); Frances Bostock and Geoffrey Jones, *Planning and Power in Iran: Ebtehaj and Economic Development under the Shah* (London: Frank Cass and Company Ltd., 1989); Pooya Azadi et al., *The Struggle for Development in Iran: The Evolution of Governance, Economy, and Society* (Stanford: Stanford University Press, 2022); Brew, *Petroleum*.

[27] See, for example, Gholāmrezā Afkhami, "Interview with Mosaddeqi, Taqi," November 30, 1987, Alexandria, VA, available at https://fis-iran.org/oral-history/mosaddeqi-taqi; Mohsen Shirāzi, "San'at-e Gāz-e Iran: Az Āghāz tā Āstāneh-ye Enqelāb," interview by Golāmrezā Afkhami (Bethesda, MD: Foundation for Iranian Studies, 1999), available online at https://fis-iran.org/ebook/sanat-e-gaz-e-iran-az-aghaz-ta-astane-ye-enqelab-the-evolution-of-irans-gas-industry-organization-policy-assessment/; Hamid Rezā 'Arāqi, *Bist Sāl bā Gāz* (Tehran: Shāpikān, 1390/2011-12); Majid Bujārzādeh and 'Ali Bahādar, *Gāz Enerzhi-ye Pāk bā Nim-e Qarn-e Talāsh: Panjāhomin Sāl-e Tasis-e Sherkat-e Melli-ye Gāz-e Iran* (Tehran: Sherkat-e Melli-ye Gāz-e Iran – Ravābat-e 'Omumi, 1395/2016-17); and Seyyed Gholāmhusayn Hasantāsh and Mikāyil 'Azimi's *Tārikh-e San'at-e Gāz-e Māy'a-ye Iran* (Tehran: Kavir, 1394/2015-16).

[28] See, for example, Sherkat-e Melli-ye Gāz-e Iran, *San'at-e Gāz-e Iran* ([Tehran?]: Enteshārāt-e Ravābat-e 'Omumi-ye San'at-e Naft-e Iran, 1352/1973-74); and Sherkat-e Melli-ye Naft-e Iran, *Naft va Zendegi* (Tehran: Enteshārāt-e Ravābat-e 'Omumi-ye San'at-e Naft-e Iran, 1352/1973-74).

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

## Natural Gas and Pipelines

Iranian officials' concern for natural gas reflected the fact that enormous volumes had been produced for decades in the oil fields of southwest Iran. Oil and gas are best understood as distinct but overlapping portions of a hydrocarbon spectrum, and the two are often comingled within petroleum deposits. From the moment that oil geysered from the earth in 1908 at Masjid-e Sulaymān, it was accompanied by natural gas, and in the following decades large amounts would be lifted as part of British Petroleum's oil operations. With company officials seeing little commercial value in the resource, the majority of that associated gas was vented into the air or flared off in great pyres above the oil fields. As early as the 1930s, however, Iranian officials applied escalating levels of pressure on the company to conserve the natural gas they were discarding. That pressure began to bear fruit in the wake of Iran's 1951–54 oil nationalization crisis, when British Petroleum and the other new consortium firms acquiesced to supporting Iranian exploitation of Khuzestān's associated gas. By the mid-1960s, new and sizable natural gas projects began to appear, most notably a plant for the production of petrochemical fertilizers near Shiraz and a small residential gas network built alongside it.[29] By that point many Iranian officials were hoping to leverage the country's gas reserves to provide inexpensive fuel for the country's rapidly growing cities, a desire met by a politically charged ambition to build a steel mill in the country. Long frustrated by American unwillingness to support the construction of such a facility, in the 1960s the Pahlavi government turned to the Soviet Union and struck a deal to pay for a steel mill with exported natural gas. For the Soviets the deal was less about obtaining access to Iranian gas—the country possessed even larger reserves—than it was about gaining an economic foothold in a neighbor closely aligned with its Cold War adversary. IGAT-1 was thus born in January 1966 with an agreement to build a pipeline running more than a thousand kilometers, from Khuzestān to the Soviet border at Āstārā, one that would not only transport gas northward to the USSR but also to Iranian cities like Tehran, Isfahan, and Kashan. Although Soviet involvement was crucial to the project, the driving force for it was the possibility of providing large amounts of inexpensive natural gas energy to Iran's urban centers.

Iranian planners saw natural gas as crucial part of their plans for industrialization in the country, expecting it to supplant oil products in a wide array of applications and thereby make more oil available for export even as the country's domestic energy needs grew. In their estimation, that energy abundance would enable Iran's modernization by powering new factories, new urban agglomerations, and even new motor vehicles, helping Iran transcend what was seen as a weak and agrarian past and step into an era of industrialized strength. Natural gas was moreover cleaner burning than the charcoal and oil products then in widespread use, and numerous officials looked to it as a potential tool for improving Iran's rapidly deteriorating urban air quality.[30] More than anything, Pahlavi officials believed the new fuel would be a great political legitimator, proving the state's top-down ability to construct a technologically sophisticated, prosperous, and environmentally friendly modernity superior to that of any other society.[31] For that future to come about, however, a lengthy pipeline would first need to be constructed. In the eyes of many Iranian officials, the Ahvāz pipe mill represented both the ability to meet an immediate need for large-diameter pipes as well as an opportunity to further the country's industrialization. But the mill, and the IGAT-1 pipeline system more broadly, was subject to considerable and complex debate regarding its precise aims and the best methods of achieving them. The importance of IGAT-1 to Pahlavi modernizing programs led to numerous governmental institutions having a hand in its design and management. The program's leadership was centered in the

[29] Ciruce Movahedi-Lankarani, "The Domain of Gas: Energy Technologies and the Environment in Modern Iran, 1935-1995", PhD Diss., (University of Pennsylvania, 2020), 113–38.

[30] Ciruce Movahedi-Lankarani, "A Ghoul at the Gates: Natural Gas Energy and the Environment in Pahlavi Iran, 1960-1979," *International Journal of Middle East Studies* 54, no. 1 (2022), 80–99.

[31] Movahedi-Lankarani, "The Domain of Gas."

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

National Iranian Gas Company (NIGC), established in 1965 as a subsidiary of the National Iranian Oil Company to both direct the construction of IGAT-1 and centralize all affairs related to natural gas in the country. Overseen by a committee headed by the prime minister and seeking to give voice to "stakeholder organizations" like the Ministry of Power and the Ministry of Industry and Mines, NIGC's work on IGAT-1 was guided by a "high commission" composed of NIOC's managing director, the head of Iran's central bank, and the director of the Plan Organization. In practice it was this last group that made most major decisions regarding the pipeline project.[32] Although the technical work of the pipeline system's design, ongoing in the spring of 1966, was entrusted to the Iranian Management and Engineering Group (IMEG), a British engineering services company, crucial decisions like the diameter—and therefore the total carrying capacity—of the pipeline were made by the commission. Its policy-driven choices about route and the size of intended markets would be reflected in pipeline itself, a reality that cascaded through the project as new questions about how to best meet the material requirements of those choices were prompted.

One particularly contentious debate was whether or not to produce steel pipes domestically. It was a decision that had tremendous potential to either advance Iranian officials' broader industrialization goals or undermine the viability of the pipeline project. At root were tensions between cost and time, weight and distance, and the need to balance the financial health of the pipeline program with the aggressive construction schedule that the gas-for-steel mill deal required. Complicating the situation was IGAT-1's need for extensive external financing. The USSR had pledged some $286 million worth of work credits, but the remaining $714 million gap would have to be met through other sources. Potential creditors, mostly foreign governments, aggressively tied their offers of financing to Iran's willingness to conclude construction and supply contracts to their national firms.[33] The ambitious goal of an early 1970 completion increased the pressure, because orders for materials like steel pipe required lengthy lead times of six months or more, and the parallel construction of many sections meant that large quantities of pipe would be ordered and paid for early in the construction process.[34] Any delivery complications would cause significant and cascading delays in the project, a poor outcome that would further imperil the original deal with the Soviet Union. Such a development would moreover be disastrous for a broad swath of Iran's development programs; if the country did not meet its gas export requirements to the USSR, it would be forced to dip into its limited reserves of hard currency to pay for work on the steel mill.[35] Sourcing of the steel pipe, the single largest expenditure for IGAT-1, was a crucial determinant of whether the project could stay within its planned budget and schedule. Importing finished pipes was a straightforward and comparatively safe option, but one that weakened Iranian officials' ability to negotiate advantageous contracts. More significantly, importing pipe threatened to undermine the developmentalist potential of the IGAT-1 program in its entirety. The pipeline system was aimed at providing cheap energy for Iranian cities, but it also was intended to help foster the country's industrialization

[32] Sherkat-e Melli-ye Gāz-e Iran, "F'āliat-hā va 'Amalkard-e Sherkat-e Melli-ye Gāz-e Iran tay Durān-e Barnāmeh-hā-ye 'Omrāni-ye Chahārom va Panjom," 16 Bahman 2535/1977, 1–2, Documents and Publication Center of the Plan and Budget Organization of the Islamic Republic of Iran, Tehran; Report from Sa'id Naqavi for the NIOC to Mehdi Sami'i of the Plan Organization, 2/gl/2372, 14 Bahman 1347/1969, 4, Documents and Publications Center of the Plan and Budget Organization of the Islamic Republic of Iran, "Tarh-e Ehdās Shāhluleh-ye Gāz va Enteqāl-e Ān beh Shoravi" (230-9079), Riāsat-e Jomhuri, National Archives of Iran, Tehran (hereafter TES).

[33] American Embassy Tehran to Department of State, Airgram A-553, 10 February 1966, 1, 3–5, 8–9, Iran's Steel Mill/Natural Gas Agreements with the Soviet Union, file AID 6 Iran, 1964-1966 Subject Numeric File, RG 59: General Records of the Department of State, U.S. National Archives (hereafter NARA); Bowler, "IGAT - Note on Procedure to be adopted for the letting of construction and supply contracts," undated, 3–4, attached to Document 593, 22 May 1966, attached to Letter 4 July 1966, TES.

[34] IMEG, "Iranian Gas Trunkline for N.I.O.C.," undated, 1–2, attached to letter from I. J. Bowler to Nikpey, 4 July 1966, TES.

[35] American Embassy Tehran to Department of State, Airgram A-553, 10 February 1966, 1, 3-5, 8-9, NARA.

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

through the creation of new facilities supporting its construction and maintenance. A pipe mill, the first to be built in Iran, had the potential of furthering both goals.

## A Firm Policy Decision

Choosing whether to produce pipes domestically became one of the first and most important decisions facing the leaders of the IGAT-1 program. At first they looked abroad. The USSR itself was a possibility, for although Iran's northern neighbor was to provide gas compressors and pumps for the main pipeline, it was clear that shortages within their own country precluded any possibility of supplying pipe as well.[36] A search was undertaken elsewhere in Europe, with producers in Austria, Czechoslovakia, and Germany quickly emerging as frontrunners.[37] Despite the field quickly being narrowed to only the German offers, there remained persistent doubts on the part of some officials about the wisdom of relying upon a single "foreign company" for such a high profile project.[38] With the shah expressing personal interest in IGAT-1 and the possibility of domestic pipe production, a "comprehensive report" on the idea of establishing a pipe mill in Iran was "studied and approved" in May 1966—only half a year before construction on the pipeline was slated to commence.[39] Pressed by the tight scheduling, by the next month Iranian officials from NIOC and the office of the prime minister were already considering proposals from two contractors for the design and construction of a pipe mill at Ahvāz. One offer, put forth by a partnership between Mannesmann AG and Thyssen AG, was considered a poor prospect, requiring a $15 million initial investment, and producing pipe at a "very high" minimum cost of $228 per ton. Their proposed timeline was moreover quite long, with the mill not slated for completion until more than a year after the start of pipeline construction. A late offer from Torrance Machine and Engineering of Los Angeles, a firm specializing in the construction of pipe mills, proved to be significantly more attractive. With a schedule of only nine months, the expected $8 million initial investment would result in pipe beginning to reach the IGAT-1 construction sites a few months after work was scheduled to begin. Torrance's proposed mill, sited in Ahvāz because of its proximity to the Muhammad Rezā Shah Pahlavi Dam's supply of electricity, would take imported steel sheets to produce 10,000 tons of 18- to 42-inch diameter pipe in its first month before ramping up to full-scale monthly production of 20,000 tons. At that rate, some 63 to 80 percent of the estimated 500,000 tons of pipe needed for the IGAT-1 line could be produced within Iran. Total cost per ton of pipe was estimated at $199, of which 83 percent ($165) was tied to the cost of buying and transporting steel to Ahvāz.[40] That per-ton price was far more competitive than the German proposal, on par with the average expected cost of having finished pipe delivered to Bandar Shāhpur, the likely port of entry for any foreign purchases.[41]

The comparison to price at portside was crucial, because the relevant cost was not for the production of pipe, but for its delivery—an amount influenced by both the weight and volume of the transported product.[42] For the steel pipes that would form the backbone of the pipeline system, delivery costs were influenced directly by the steel's material form, because stacking finished pipes took far more volumetric space than their equivalent tonnage in unformed steel sheets. The simple geometry of cylinders and sheets became the foundation for officials' decision to include domestic pipe production in the IGAT-1 program. This is the heart of the influence of materiality on the history of the Ahvāz pipe mill. It was not the

[36] American Embassy Tehran to Department of State, Airgram A-553, 10 February 1966, 4, NARA.

[37] Telegram from Atābaki to Hoveydā, 4/4251, 10 Bahman 1344/30 January 1966, TES; Telegram from Hoveydā to Atābaki, 28 Bahman 1344/17 February 1966, TES.

[38] Telegram from Hoveydā to Atābaki, 28 Bahman 1344/17 February 1966, TES.

[39] Letter from Hoveydā to Shah, 13 Khordād 1345/3 June 1966, TES.

[40] Letter from Eqbāl at NIOC to Prime Minister, 25 Khordād 1345/15 June 1966, 3, 6, TES.

[41] Letter from Hoveydā to Shah, 4/1252, 25 Khordād 1345/15 June 1966, 1, TES.

[42] "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1350/1971-72), 6.

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

overriding reason, but a subtle and influential factor underlying the decision regarding domestic pipe production. It was in combination with cost, commerce, and developmentalist ambitions that weight and volume became meaningful, an assemblage of factors that made the domestic Ahvāz pipe mill and the industrialization it promised a viable option for Iranian decisionmakers. Focusing on materiality does not erase the human factors, but it illuminates the choice of Iranian officials to move ahead with the plant despite the risks it entailed to the crucial pipeline project. As will be seen, Iranian planners were not prioritizing other aims; rather, they believed that the material weight and volume of steel in its varying forms made domestic pipe production a viable short-term option for the pipeline program as well as a catalyst for the country's longer term industrialization.

Indeed, the question of whether or not the Pahlavi government should invest in the pipe mill, and the extent to which it could or should be relied upon to supply IGAT-1, went directly to the heart of the conflicting motivations underlying the project. At stake was every aspect of IGAT-1, from its carrying capacity to the financial arrangements, and even the extent to which the project's own best interests should be subordinated to the country's broader industrializing goals. Although producing pipes domestically put IGAT-1's schedule at risk, it also offered tantalizing benefits for the numerous oil and water pipelines slated to be built in the following years. Perhaps even more tempting was the possibility of export, an outcome that could see Iran supplying pipe to the sizable petroleum industries of surrounding countries.[43] There was, however, significant doubt about the feasibility of Torrance's plan. IMEG, consulting on the design and engineering of IGAT-1 and asked to evaluate the competing pipe mill proposals, considered Torrance's nine-month schedule recklessly optimistic. Moreover, Torrance's offer provided nothing for either the provision of steel or the mill's financing, elevating the risk to the pipeline project.[44] Indeed, in the opinion of IMEG evaluators the entire idea of building a pipe mill in Iran was suspect. In their opinion,

> The installation of a pipe making factory in Iran, from the perspective of the IGAT-1 plan, is not affordable (based on the purchase of pipe from abroad) and relying on domestically manufactured pipes will possibly delay the work program.[45]

Nor were they convinced that the pipe could be supplied for as little as Torrance's promised $199 per ton, estimating that the final cost might be some 10 to 15 percent higher, an overrun sufficient to make manufacturing pipe more expensive than importing it. Hopes that the mill might become a profitable export industry were likewise unrealistic in their view, as domestic and regional markets for large-diameter pipes were of unknown but likely limited size. Catering to the more robust market for small- and medium-diameter pipes could be done but would raise the cost of the mill by some $2 million and would have to wait until IGAT-1 was completed. From "the perspective of the economy of the IGAT-1 plan," IMEG evaluators wrote, "ordering the factory is not justified" and carried substantial risks. Nonetheless, if one of the goals of the IGAT-1 program was the "encouragement and advancement of industries" as opposed to solely the transport of gas to Iranian cities and the Soviet border, and should "the government be willing to tolerate damage and danger to the [IGAT-1] project," then the construction of a pipe mill in Iran could be "justified." If the decision were made to pursue domestic production, IMEG judged that an agreement with Torrance would need to be reached before the end of June 1966 if the mill was to supply a meaningful portion of IGAT-1's requirements.[46]

IMEG was not alone in expressing doubts, with some, like the head of Iran's National Petrochemical Company, worrying that domestic production was foolish as "everybody

[43] Ibid., 8.
[44] Letter from Eqbāl at NIOC to Prime Minister, 25 Khordād 1345/15 June 1966, 3, 6, TES.
[45] Ibid., 3.
[46] Ibid., 4–5.

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knows" the only country truly possessing such a capability was the United States.[47] Despite these reservations, at a meeting of high-ranking Iranian officials on June 16—one that included the prime minister, deputy prime minister, minister of the economy, head of Iran's central bank, and officials from IMEG and NIOC—the pipe mill's construction was approved on the basis that the expected price difference between imported and domestically manufactured pipe would be "marginal."[48] Helping persuade them were Torrance's willingness to take a 20 percent stake in the project and the company's reputation for quick work, factors that the committee felt negated IMEG's fretting.[49] A "firm policy decision" was made to accept Torrance's proposal using credit from the Export–Import Bank of the United States, and the shah subsequently ordered that "immediate action be taken for the establishment of the proposed factory."[50] Five days later, on June 21, NIOC and Torrance agreed to a plan that aimed for the mill's operational start within twelve months, fully committing the Iranian government to the project.[51] It was a fateful decision for the IGAT-1 project, subordinating it to the broader industrialization goals that Pahlavi planners had chosen to pursue. As the episode demonstrated, IGAT-1 was understood by Iranian decisionmakers in multiple ways—as a project to provide cheap energy, but also a means to jump-start new Iranian industries. It also was a choice rooted in material form and the simple relationship between geometry and volume. Material factors made the idea of domestic production financially competitive with importing finished pipe, influencing all subsequent debates about risk and cost. It also would be a factor in subsequent debates about the long-term potential of the mill.

## Diameter and Delay

In the following months, questions about whether the aims of the new pipe mill should extend beyond supporting the IGAT-1 project were distilled to a debate about the maximum size of pipe to be produced at the facility. Original plans had called for it make the 42-inch pipes that the main IGAT-1 pipeline required, but further study had found that an additional investment of only $400,000 could lay the foundation for production of diameters up to 48 inches in size.[52] From an engineering and design point of view the change would be relatively straightforward, as the facility was already comprised of two separate production floors that specialized in small and large diameter pipes, respectively.[53] Figures like Prime Minister Hoveydā were tempted by the prospect of producing larger pipes, attracted to the idea of possessing one of the few facilities in the world able to do so, and they directed IMEG to revisit Torrance's proposal and evaluate the feasibility of expanding the mill.[54] For their part, IMEG evaluators found that the $400,000 price tag was the bare minimum, encompassing only the expanded workshop space and none of the expensive machine tooling that also would be required. Even more alarming was the fact that there was little obvious market for pipes of 48-inch diameter because the "difficulties of handling it are considerable" and pipeline contractors possessed "very limited" experience with such large pipe.[55] In IMEG's opinion there was little to justify a larger mill other than a hope that future pipeline projects

[47] American Embassy Tehran to Department of State, Airgram A-553, 10 February 1966, TES; Iran's Steel Mill/Natural Gas Agreements with the Soviet Union, 5–6, TES.

[48] Report from Nāser Manuchehri to Eqbāl, 1/gh/1178, 26 Khordād 1345/16 June 1966, 2, TES.

[49] Ministry of the Economy, "Report Pertaining to the Establishment of a Pipe Mill in Iran," 8 Tir 1345?/29 June 1966?, 3, TES; Letter from Eqbāl at NIOC to Prime Minister, 25 Khordād 1345/15 June 1966, 6–7, TES.

[50] Letter from Hoveydā to Shah, 4/1252, 25 Khordād 1345/15 June 1966, 1, TES; Letter from Hoveydā to Eqbāl, 4/1280, 26 Khordād 1345/16 June 1966, TES.

[51] Report from Nāser Manuchehri to Eqbāl, Meeting Minutes on "Construction of the Pipe Mill in Iran," 80/gr/1189, 28 Khordād 1345/18 June 1966, 3, attached "Letter of Intent," 21 June 1966, 1, TES.

[52] Letter from Hoveydā to Shah, 4/1281, 26 Khordād 1345/16 June 1966, TES.

[53] "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1346/1967-68), 8, 40.

[54] Report from Nāser Manuchehri to Eqbāl, Meeting Minutes on "Construction of the Pipe Mill in Iran," 1–2, TES.

[55] Report from IMEG, 18 June 1966, 1, TES.

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would be designed to use its output.[56] In this sense, the desire to expand the project of officials like Hoveydā was more a reflection of their hopes for Iranian industrial development than the commercial realities of the day. It was moreover a discussion influenced by materiality, as the feasibility of the proposal was determined not just by questions of cost and risk, but also the physical reality that potential customers would face working with such large pipes.

On the other hand, meeting with their Iranian counterparts to discuss the IGAT-1 project, Soviet negotiators threw their support behind the proposal to expand the pipe mill, seeing it as an opportunity to take more gas and more deeply cement their foothold in Iran's economy. Iranian officials were willing to consider the change in large part because the original choice to build a 42-inch diameter pipeline had been driven by Soviet willingness to take substantial volumes of natural gas. Indeed, an earlier design, intended only to serve Iranian cities, had called for a pipeline of significantly smaller size. Nonetheless, final acceptance of the proposal was far from straightforward, depending upon

> 1—The amount of investment for the government of Iran. 2—The supply of needed sheets of metal and the possibility of installation of large 48-inch pipes that would require importation of machinery from the West. 3—The period it would take to implement the plan and the date of the commencement of delivery of gas to the Soviet Union.[57]

The mill's scope was clearly understood as part of the broader developmental concerns of Iranian officials, particularly with reference to stability of the IGAT-1 program. But as IMEG evaluators pointed out, altering the pipeline's size would entail a whole new round of study, design, and engineering of the project, not just for the pipeline itself, but also ancillary facilities—a refinery, compressor stations, and the gas gathering network. As was the case for the pipe mill's theoretical customers, it also was far from clear whether IGAT-1's construction contractors possessed the necessary equipment or expertise to work with the larger diameter pipes—a complication rooted in the materiality of steel pipes and one that threatened to put the entire project behind schedule.[58]

In the end, IMEG's opposition carried the day and the proposal to enlarge the pipeline was killed. At the same time, however, it was decided to expand the pipe mill itself in anticipation of the day when such large pipes would be needed somewhere in the region. Driving this choice was the potential that the expansion entailed, for it would transform Iran into one the few countries capable of producing pipes of such size. It also was a decision made despite the fact that delay to IGAT-1's completion remained one of the principle worries of Iranian planners. Indeed, as of late 1966 the pipe mill was already causing problems, with questions about the mill's financing eventually driving considerable construction delays. In the summer of that year the mill's expected cost had increased to some $11 million, and although NIOC had increased its investment to $3.2 million, there remained a sizable $7.5 million shortfall.[59] Credit from the US Export–Import Bank had proven to be infeasible because the bank's processes were far too cumbersome to meet the mill's aggressive construction schedule. In response, Iranian officials turned to commercial banks and their speedier practices, expecting little trouble due to the mill project's relatively low total cost.[60] By the fall, however, Torrance had turned that decision against Iranian negotiators, using the threat of delay and the ticking clock of commercial loans as weapons in a dispute over contractual terms. At question was NIOC's insistence on terms stipulating Torrance's easy removal from the project should it fail to meet certain cost and scheduling

[56] Ministry of the Economy, "Report Pertaining to the Establishment of a Pipe Mill in Iran," 8 Tir 1345?, 4, TES.
[57] Memorandum by Sa'id Naqavi, 2 Tir 1345/23 June 1966, 1–2, TES.
[58] Proceedings on Pipe Mill and Financing for IGAT-1 Project, 5 Tir 1345/26 June 1966, 7, TES.
[59] Report to Eqbāl from Naqavi, Meeting Minutes, 448, 1 Tir 1345/22 June 1966, 4, TES.
[60] Report by Nikpey, 30 Khordād 1345/20 June 1966, 1, TES.

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targets, a demand that the American company refused to consider.[61] Although Iranian officials were concerned about their investment and sought ways to recoup it should plans go awry, more important was their worry that complications could delay IGAT-1. Taking advantage of that pressure, Torrance slow walked negotiations to the point that commercial credit lines were about the expire, potentially undoing months of work, thereby strong-arming Iranian negotiators into accepting a contract without the clause in October 1966. Although Iranian officials later used their contacts in the US State Department to pressure Torrance into accepting an amended contract with the exit clause, their original willingness to strike less favorable terms was indicative of the mill's centrality to plans for both IGAT-1 and the country's industrialization.[62]

Despite questions of the pipe mill's design being settled in favor of an expanded facility, there remained the pressing issue of the cost of steel itself, an amount expected to reach hundreds of millions of dollars. Financing would again rely on foreign governments, and many potential creditors once again tied their willingness to extend loans to Iran's willingness to contract with their country's firms.[63] Seeking to simplify by using firms from countries already involved in IGAT-1, Iranian negotiators entered into extensive discussions with British, French, and Italian companies.[64] Despite considerable effort, none were interested in selling steel, offering only finished pipe, a considerable setback for the mill project.[65] Of even greater concern, the extensive modifications and delays to the pipe mill project had begun to take their toll. It had been expected that the choice to build a pipe mill would keep the need for imported pipe to 25,000 tons, but the contractual standoff with Torrance had quadrupled that requirement to a much larger 100,000 tons. Adding further complications was the late arrival of production machinery in March 1968, months behind schedule, and an unexpectedly long three-month lag time between the placing of steel orders with Japanese firms and their actual delivery to the Ahvāz mill.[66] Technical problems also arose, with the mill's equipment having "disadvantages and defects" that notably slowed production.[67] The cumulative effect of these troubles dropped the expected monthly output of the plant from 20,000 tons to only 12,000, and it was the opinion of the Japanese experts hired to troubleshoot the issues that the mill was fundamentally flawed and would never reach its promised capacity.[68] Shortfalls forced Iranian officials to look abroad for finished pipe, and in the end the mill only produced some 70,000 of the ultimate 500,000 tons of pipe needed for the IGAT-1 system, an outcome that nullified the facility's promised benefit to the pipeline project.[69]

## Conclusion

From the perspective of the first Iran Gas Trunkline project, the pipe mill at Ahvāz, over budget and far behind schedule, was a failure. To focus on that outcome, however, is to miss the broader significance of the facility to Pahlavi developmentalism and the way it manifested in material form particular understandings of industrialization. Reflecting on the pipe mill project in the late 1980s, Taqi Mosaddeqi, head of the National Iranian Gas Company in the

[61] Report from Manuchehri to Eqbāl, 3/gl/1769, 5 Ābān 1345/27 October 1966, 1–4, TES.

[62] Ibid., 4–5.

[63] Report to Eqbāl from Naqavi, Meeting Minutes, 448, 1 Tir 1345/22 June 1966, 4–5, TES.

[64] Report from Nikpey on meeting held 4 Tir 1345/25 June 1966, undated, 3–4, attached to memorandum 4/1418, TES; Proceedings on Pipe Mill and Financing for IGAT-1 Project, 5 Tir 1345/26 June 1966, 8, TES.

[65] Proceedings on Pipe Mill and Financing for IGAT-1 Project, 5 Tir 1345/26 June 1966, 1–8, TES.

[66] Memorandum from Manuchehri, undated, 6–7, attached to memorandum 41/1/5-m/29, TES; "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1350/1971-72), 41.

[67] "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1350/1971-72), 8.

[68] Memorandum from Manuchehri, 6–7, TES.

[69] Report from Sa'id Naqavi for the NIOC to Mehdi Sami'i of the Plan Organization, 2/gl/2372, 14 Bahman 1347/3 February 1969, 5, TES; Ashraf, "Natural Gas Industry in Iran.".

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1970s, argued that facility had proved itself beneficial for the country, pointing to the opposition of pipe-producing countries like Germany and Great Britain to the project during its conception. Indeed, after 1972 Iran had sharply reduced its purchase of finished pipes, and, although it continued to depend on the import of high-quality steel, the mill was nonetheless an important step in Pahlavi officials' quest to make the country "completely self-sufficient."[70] This was no small claim, because foundational to the decision to build a pipe mill at Ahvāz was the desire of Iranian officials to foster industrialization and build political legitimacy through modernizing development. As with dams, airports, and the IGAT-1 pipeline itself, the pipe mill became part of the spectacle of development, its machinery and output celebrated in publications like the National Iranian Oil Company's *Nāmeh-ye San'at-e Naft Iran*. Targeted at industry employees, between 1962 and 1979 the monthly (later quarterly) magazine reported extensively on company news, global developments in the oil and gas industries, and numerous scientific and technical advances. The Ahvāz pipe mill neatly fit this paradigm, and between late 1967 and mid-1971, when work on the IGAT-1 line wound down, the pipe mill was repeatedly featured in the magazine, typically with a strong emphasis on technical characteristics like size, productive capacity, steel inputs, and pipe diameters, all rendered through the legitimating power of numbers.[71] Such representations were further reinforced through photography.[72] But *Nāmeh* was more than a record of industry advances, because the magazine also regularly printed pieces on women's fashion, home economics, education, film and music, advice, and more, reflecting the Pahlavi state's promotion of consumer culture and the nuclear family during that period.[73] Although the magazine was targeted at industry workers and their families, its broader orientation went well beyond oil and gas to include Pahlavi developmentalism writ large. And what the magazine in its entirety seemingly promised to its readers was an industrialized, high tech, consumer society, of which the Ahvāz pipe mill and the gas infrastructure it was built to support were an integral part. Official Pahlavi outlets thus depicted the mill as embodying the country's modernization, and did so in a way that emphasized its materiality.

In the end the facility that *Nāmeh* presented was the product of a compromise between competing visions for Iran's industrialization. Although the original impetus for the pipe mill's construction had been the volumetric difference between steel sheets and steel pipes, the driving force proved to be the desire among Iranian officials to foster new industry. There had been less consensus about whether the new industry was should prioritize support for the IGAT-1 project or also aim to meet current and future needs in the country and across the Persian Gulf. The two options were distilled to a debate about equipping the mill to produce pipes of up to forty-eight inches in diameter. IGAT-1 had no need for 48-inch pipes, and, despite Soviet willingness to take the extra gas that could be transported with the larger diameter pipes, the pipeline was in the end not altered. What did change, however, was the pipe mill itself. With the mill's capacity to produce different sizes of pipe, Iranian development planners inscribed their visions for Iran's industrialized future in the material forms that steel could take. There were no concrete plans anywhere in the world for such large pipes to be used, but possessing the means to meet the potential demand was deemed to be in itself a worthy investment. In this way, the Ahvāz pipe mill embodied not just the requirements of the IGAT-1 project but also competing ideas of what Pahlavi development planners imagined—and promised—the future might hold.

[70] Afkhami, "Interview," 23–24.

[71] Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995).

[72] "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1346/1967-68); "Bayāt-e Jenāb Āqā-ye Doktor Eqbāl," 44-45; "Hadaf az Ijād-e Kārkhāneh-hā-ye Lulehsāzi," (1346/1967-68), 8; "Naft-e Ahvāz," (1349/1970-71), 11-13, 43; "Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," (1350/1971-72), 6-9, 40-3.

[73] Pamela Karimi, *Domesticity and Consumer Culture in Iran: Interior Revolutions of the Modern Era* (New York: Routledge, 2013).

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The mill's design reflected the multiple ambitions circulating among Iranian officials, but the compromise that took shape also was rooted in the interactions between the weight, volume, and shipping costs of steel's material forms. Through the lens of the Ahvāz pipe mill, we see the indelible thread of materiality in the industrializing policies of Pahlavi Iran. This complicates histories of development within the country that have long prioritized the roles of oil revenues, royal ambition, and macroeconomic planning. Steel's form influenced officials' sense of what was possible; officials chose to pursue the construction of a mill and expand its scope over the strong objections of their own hired experts, a reflection of the strength of their developmentalist ambitions. More than economic growth or political legitimation, the pipe mill was a manifestation of orientation toward the future, made visible by focusing on materiality and its connection to social processes. This helps us better understand the competing impulses that shaped Pahlavi-era industrialization policies, aspects of the story that are lost when focusing only on high level development planning or the political fortunes of prominent figures. It was through individual projects and the ideas they manifested that Iranian development was built, and it is in their designs and material forms that the traces of alternatives are made visible.

**Competing interest.** The author declares none.

**Financial Support.** This work was supported by the National Endowment for the Humanities.

## Bibliography

### Archives and Document Collections

Documents and Publications Center of the Plan and Budget Organization of the Islamic Republic of Iran. Tehran, Iran.
National Library and Archives of the Islamic Republic of Iran. Presidential Files. National Archive of Iran. Tehran, Iran.
US National Archives, Department of State, RG 59. College Park, MD.

### Published Sources in Persian

Afkhami, Gholāmrezā. "Interview with Mosaddeqi, Taqi." November 30, 1987. Alexandria, Virginia. Foundation for Iranian Studies. https://fis-iran.org/oral-history/mosaddeqi-taqi.
"Bayāt-e Jenāb Āqā-ye Doktor Eqbāl dar Marāsem-e Goshāyesh-e Kārkhāneh-ye Lulehsāzi." *Nāmeh-ye San'at-e Naft-e Iran* 6, no. 7 (1346/1967-68): 44-45.
"Hadaf az Ijād-e Kārkhāneh-hā-ye Lulehsāzi," *Nāmeh-ye San'at-e Naft-e Iran* 6, no. 7 (1346/1967-68): 8.
"Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," *Nāmeh-ye San'at-e Naft-e Iran* 6, no. 7 (1346/1967-68): 8, 40.
"Kārkhāneh-hā-ye Lulehsāzi-ye Ahvāz," *Nāmeh-ye San'at-e Naft-e Iran* 10, no. 3 (1350/1971-72): 6-9, 40-3.
"Naft-e Ahvāz," *Nāmeh-ye San'at-e Naft-e Iran* 9, no. 3 (1349/1970-71): 11-13, 43.
Sherkat-e Melli-ye Gāz-e Iran. *San'at-e Gāz-e Iran*. Tehran: Enteshārāt-e Ravābat-e 'Omumi-ye San'at-e Naft-e Iran, 1352/1973-74.
Sherkat-e Melli-ye Naft-e Iran. *Naft va Zendegi*. Tehran: Enteshārāt-e Ravābat-e 'Omumi-ye San'at-e Naft-e Iran, 1352/1973-74.
Shirāzi, Mohsen. "San'at-e Gāz-e Iran: Az Āghāz tā Āstāneh-ye Enqelāb." Interview by Gholāmrezā Afkhami. Foundation for Iranian Studies, 1999. https://fis-iran.org/ebook/sanat-e-gaz-e-iran-az-aghaz-ta-astane-ye-enqelab-the-evolution-of-irans-gas-industry-organization-policy-assessment/.

### Secondary Literature in Persian

'Arāqi, Hamid Rezā. *Bist Sāl bā Gāz*. Tehran: Shāpikān, 1390/2011-12.
Ardekāni, Husayn Mahbubi. *Tārikh-e Moassesāt-e Tamaddoni-ye Jadid dar Iran*, 2nd ed., vol. 3. Tehran: Enteshārāt-e Dāneshgāh-e Tehran, 1376/1997-98.
Bujārzādeh, Majid, and 'Ali Bahādar. *Gāz Enerzhi-ye Pāk bā Nim-e Qarn-e Talāsh: Panjāhomin Sāl-e Tasis-e Sherkat-e Melli-ye Gāz-e Iran*. Tehran: Sherkat-e Melli-ye Gāz-e Iran, Ravābat-e 'Omumi, 1395/2016-17.
Hasantāsh, Seyyed Gholāmhusayn, and Mikāyil 'Azimi. *Tārikh-e San'at-e Gāz-e Māy'a-ye Iran*. Tehran: Kavir, 1394/2015-16.

https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

## Secondary Literature in English


Abrahamian, Ervand. *A History of Modern Iran*. Cambridge, UK: Cambridge University Press, 2008.

Abrahamian, Ervand. *Iran: Between Two Revolutions*. Princeton, NJ: Princeton University Press, 1982.

Alvandi, Roham. *Nixon, Kissinger, and the Shah: The United States and Iran in the Cold War*. Oxford, UK: Oxford University Press, 2014.

Ansari, Ali M. "The Myth of the White Revolution: Mohammad Reza Shah, 'Modernization' and the Consolidation of Power." *Middle Eastern Studies* 37, no. 3 (2001): 1–24.

Ashraf, Pirooz. "Natural Gas Industry in Iran." February 26, 2016. *Encyclopedia Iranica*. http://www.iranicaonline.org/articles/natural-gas-industry-in-iran.

Azadi, Pooya, Mohsen B. Mesgaran, and Matin Mirramezani. *The Struggle for Development in Iran: The Evolution of Governance, Economy, and Society*. Stanford, CA: Stanford University Press, 2022.

Bennett, Jane. "The Agency of Assemblages and the North American Blackout." *Public Culture* 17, no. 3 (2005): 445–65.

Blackbourn, David. *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany*. New York: Norton, 2006.

Bostock, Frances, and Geoffrey Jones. *Planning and Power in Iran: Ebtehaj and Economic Development under the Shah*. London: Frank Cass, 1989.

Brew, Gregory. *Petroleum and Progress in Iran: Oil, Development, and the Cold War*. Cambridge, UK: Cambridge University Press, 2022.

Clawson, Patrick. "Knitting Iran Together: The Land Transport Revolution." *Iranian Studies* 26, no. 3/4 (1993): 235–50.

Dietrich, Christopher R. W. *Oil Revolution: Anticolonial Elites, Sovereign Rights, and the Economic Culture of Decolonization*. Cambridge, UK: Cambridge University Press, 2017.

Esfahani, Hadi Salehi, and M. Hashem Pesaran. "The Iranian Economy in the Twentieth Century: A Global Perspective," *Iranian Studies* 42, no. 2 (2009): 177–211.

Ferguson, James. *The Anti-Politics Machine: "Development," Depoliticization, and Bureaucratic Power in Lesotho*. Minneapolis, MN: University of Minnesota Press, 1994.

Harvey, Penny, and Hannah Knox. *Roads: An Anthropology of Infrastructure and Expertise*. Ithaca, NY: Cornell University Press, 2015.

Hooglund, Eric J. *Land and Revolution in Iran, 1960–1980*. Austin, TX: University of Texas Press, 1982.

Jones, Christopher F. *Routes of Power: Energy and Modern America*. Cambridge, MA: Harvard University Press, 2014.

Jones, Toby Craig. *Desert Kingdom: How Oil and Water Forged Modern Saudi Arabia*. Cambridge, MA: Harvard University Press, 2010.

Karimi, Pamela. *Domesticity and Consumer Culture in Iran: Interior Revolutions of the Modern Era*. New York: Routledge, 2013.

Koyagi, Mikiya. *Iran in Motion: Mobility, Space, and the Trans-Iranian Railway*. Stanford, CA: Stanford University Press, 2021.

Koyagi, Mikiya. "Pedalling in Pahlavi Iran: Cycle Mobility and Competing Masculinities." *Journal of Transport History* 45, no. 1 (2024): 41–61.

Larkin, Brian. "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42 (2013): 327–43.

Larkin, Brian. "Promising Forms: The Political Aesthetics of Infrastructure." In *The Promise of Infrastructure*, edited by Nikhil Anand, Akhil Gupta, and Hannah Appel, 175–202. Durham, NC: Duke University Press, 2018.

Latour, Bruno. *Aramis, or the Love of Technology*. Translated by Catherine Porter. Cambridge, MA: Harvard University Press, 1996.

Latour, Bruno. *The Pasteurization of France*. Translated by Alan Sheridan and John Law. Cambridge, MA: Harvard University Press, 1988.

Mahdavy, H. "The Patterns and Problems of Economic Development in Rentier States: The Case of Iran." In *Studies in the Economic History of the Middle East*, edited by M. A. Cook, 428–57. London: Routledge, 1970.

Mitchell, Timothy. *Carbon Democracy: Political Power in the Age of Oil*. London: Verso, 2011.

Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. Berkeley, CA: University of California Press, 2002.

Mofid, Kamran. *Development Planning in Iran: From Monarchy to Islamic Republic*. Cambridgeshire, UK: Middle East and North Africa Press, 1987.

Movahedi-Lankarani, Ciruce. "A Ghoul at the Gates: Natural Gas Energy and the Environment in Pahlavi Iran, 1960–1979," *International Journal of Middle East Studies* 54, no. 1 (2022): 80–99.

Movahedi-Lankarani, Ciruce. *"The Domain of Gas: Energy Technologies and the Environment in Modern Iran, 1935–1995."* PhD diss., University of Pennsylvania, 2020.

Movahedi-Lankarani, Ciruce. "Precarious Petroleum: Volatile Reservoirs, Varied Natural Gas Compositions, and Development in 1960s Iran." *Comparative Studies of South Asia, Africa and the Middle East* 44, no. 1 (2024).

Najmabadi, Afsaneh. *Land Reform and Social Change in Iran*. Salt Lake City, UT: University of Utah Press, 1987.

Nassehi, Ramin. "Domesticating Cold War Economic Ideas: The Rise of Iranian Developmentalism in the 1950s and 1960s." In *The Age of Aryamehr: Late Pahlavi Iran and Its Global Entanglements*, edited by Roham Alvandi, 35–69. London: Gingko Library, 2018.


https://doi.org/10.1017/irn.2024.31 Published online by Cambridge University Press

Pickering, Andrew. *The Mangle of Practice: Time, Agency, and Science*. Chicago: University of Chicago Press, 1995.
Porter, Theodore M. *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life*. Princeton, NJ: Princeton University Press, 1995.
Razavi, Hossein, and Firouz Vakil. *The Political Environment of Economic Planning in Iran, 1971–1983: From Monarchy to Islamic Republic*. Boulder, CO: Westview Press, 1984.
Schayegh, Cyrus. "Iran's Global Long 1970s: An Empire Project, Civilisational Developmentalism, and the Crisis of the Global North." In *The Age of Aryamehr: Late Pahlavi Iran and Its Global Entanglements*, edited by Roham Alvandi, 260–89. London: Gingko Press, 2018.
Schayegh, Cyrus. "Iran's Karaj Dam Affair: Emerging Mass Consumerism, the Politics of Promise, and the Cold War in the Third World," *Comparative Studies in Society and History* 54, no. 3 (2012): 612–43.
Schayegh, Cyrus. "'Seeing Like a State': An Essay on the Historiography of Modern Iran," *International Journal of Middle East Studies* 42, no. 1 (2010): 37–61.
Scott, James C. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press, 1998.
Shafiee, Katayoun. *Machineries of Oil: An Infrastructural History of BP in Iran*. Cambridge, MA: MIT Press, 2018.

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**Cite this article:** Movahedi-Lankarani CA (2025). A Firm Policy Decision: Infrastructural Form and Pahlavi Developmentalism at the Ahvāz Pipe Mill. *Iranian Studies* 1–17. https://doi.org/10.1017/irn.2024.31