

How Asia's Auto Boom Shapes its Energy Security Strategies

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Between now and 2050, nearly two-thirds of all growth in global demand for oil is anticipated to come from developing Asia, and Asia's need for oil will be overwhelmingly driven by just one sector—transportation.¹ Central to this story is growing desire for travel via automobiles, including private cars, taxis, buses, and trucks. Already, Japan, China, and India are three of the world's four largest automobile markets²—and according to the Institute of Energy Economics, Japan (IEEJ), Asia's auto fleet will likely triple by 2050.³ To put Asia's pace of growth in perspective, in China alone, new vehicle registrations topped 24 million in 2017.⁴ This is equivalent to building a fleet roughly half the size of Germany's in just one year.⁵ Meanwhile, car ownership in India continues to grow at a rate of 10 percent a year.⁶ And given Southeast Asia's demographic

¹ Ken Koyama, "Key Points of IEEJ Outlook 2018," The Institute of Energy Economics, Japan (IEEJ) (October 2017), <https://eneken.iecej.or.jp/data/7588.pdf> (accessed 25 April 2018): 1; IEEJ, "IEEJ Outlook 2018," IEEJ, (October 2017), <http://eneken.iecej.or.jp/data/7748.pdf> (accessed 25 April 2018): 9.

² Moneycontrol News, "India is Now World's 4th Largest Automobile Market, Outpaces Germany with 9.5% Growth in Sales," Moneycontrol News (26 March 2018), <https://www.moneycontrol.com/news/business/india-is-now-worlds-4th-largest-automobile-market-outpaces-germany-with-9-5-growth-in-sales-2536215.html> (accessed 19 April 2018); Henk Bekker, "2017 (January to December) International: Car Sales Worldwide," 17 January 2018, <https://www.best-selling-cars.com/international/2017-january-december-international-car-sales-worldwide/> (accessed 19 April, 2018). Although the Republic of Korea possesses a vibrant manufacturing industry, with a population on par with Japan's and relatively more modest domestic demand and sales, it fails to qualify for this list. Jamal Amir, "New Vehicle Sales in South Korea Grow 8.7% y/y in January," IHS Markit, 6 February 2018, <https://ihsmarkit.com/research-analysis/New-vehicle-sales-in-South-Korea-grow.html>

³ IEEJ, "Asia/World Energy Outlook 2016: Consideration of 3E's+S Under New Energy Circumstances in the World," (October 2016), <http://eneken.iecej.or.jp/data/7199.pdf> (accessed 26 April 2018): 211.

⁴ Henk Bekker, "2016 (Full Year) International: Worldwide Car Sales," *Car Sales Statistics*, 19 January 2017, <http://www.best-selling-cars.com/international/2016-full-year-international-worldwide-car-sales> (accessed 19 April 2018).

⁵ *IHS Markit*, "Five Critical Challenges Facing the Automotive Industry: A Guide for Strategic Planners," <https://ihsmarkit.com/industry/automotive/china/ap4.html>, (accessed 20 April 2018): 3; Eurostat, "Passenger Cars in the EU," http://ec.europa.eu/eurostat/statistics-explained/index.php/Passenger_cars_in_the_EU (accessed April 19, 2018).

⁶ Isha Sharma, "Indian Passenger Vehicle Sales Up Over 6 Percent in March, CV Sales Surge over 24 Percent," *IHS Markit*, 11 April 2018, <https://ihsmarkit.com/research-analysis/indian-passenger-vehicle-sales.html> (accessed 19 April 2018).

outlook and growing economic clout, its rising demand may remake the global outlook for automotive supply and demand.⁷

In this essay, we explore how Asia's auto boom will shape its energy and environmental security outlook and identify options for how policymakers and industry can respond. We begin with a brief overview of key dynamics at play in Asia's growing demand for automobiles. Next, we explore how the regional countries hope to mitigate the extent to which road-based transit will spur greater demand for oil, first, by engaging more robust urban planning, and second, by changing patterns in consumption through raising efficiency standards and promoting new and more advanced technologies. Last, we look at how countries across the region are evaluating their options for reducing prospects that oil security strategies could contribute to regional conflict, ultimately argue that countries need to accelerate progress on regional cooperation.

The Oil-Transportation Nexus and Asia's Auto Boom

Asia's search for energy security is an issue of national security for policymakers across the region, and oil supply questions play an important role in this assessment.⁸ Japan and South Korea are already 100 percent reliant on oil imports to meet their needs, while China and India have also seen their self-sufficiency decline dramatically in recent years. While some countries such as Brunei, Malaysia, and Indonesia are important regional exporters, their production levels have also struggled to keep pace with evolving domestic demand, contributing to periodic debates about how much of their oil supply should be reserved for domestic use. For policymakers across Asia, the overriding concern is not just that declining self-sufficiency could push them into an international marketplace where supplies are expensive or limited. As Herberg and others have noted, it is also that numerous countries have used their ability to redirect or disrupt access to oil as leverage in an attempt to reshape power relations—to the detriment of trust in the reliability of markets.

With this context in mind, Doshi and Bin Zahur note that countries across the region have historically taken aim at reducing or eliminating reliance on oil in power generation and also looked to reduce inefficiency in oil demand and consumption in transportation.⁹ However, a high degree of reliance on oil in the transportation sector has persisted given more limited viable, affordable, and desirable alternative fuel options that could enable switching.¹⁰ Meanwhile, Herberg notes that Asia's major powers have

⁷ PWC, "Riding Southeast Asia's Automotive Highway," November 2015, https://www.pwc.com/kr/ko/industries/automotive/201511_riding-southeast-asia-automotive-highway_en.pdf (accessed April 25, 2018): 2.

⁸ For more on this topic, Mikal Herberg's work on the strategic and economic dimensions of Asian energy security strategies, much of which can be found at NBR.org, is considered to be among the leading in the field. The authors of this essay are indebted to his insights and analysis on these points.

⁹ Tilak K. Doshi and Nahim Bin Zahur, "Energy-Efficiency Policies in the Asia-Pacific: Can We Do Better?" *The National Bureau of Asian Research (NBR) 2013 Pacific Energy Summit*, http://www.nbr.org/downloads/pdfs/eta/PES_2013_summitpaper_Doshi_Zahur.pdf, (accessed 19 April 2018): 2.

¹⁰ That is to say, while several switching options have long been readily available for power generation—switching from oil to coal, gas, nuclear, or renewables, for example—a similar range of options

traditionally viewed oil supply security initiatives in zero-sum terms, instead pursuing “a national competitive approach that intensifies distrust, worsens maritime tensions, and aggravates key strategic rivalries.”¹¹

It is against this backdrop that Asia’s auto boom is occurring. In real terms, most of Asia’s demand is relatively recent. IEEJ estimates that in 1980, there were fewer than 50 million cars on the road in all of Asia, with the highest concentration by far in Japan.¹² Contrast this with 2014, when the number of cars in Asia surpassed 350 million, and analysts expect that by 2040 this will jump to 900 million.¹³ By and large, this transformation can be seen as tracking with broader regional demographic and macroeconomic trends, including improving standards of living and personal incomes; rapid rates of urbanization; and the rise of first China and now India (and increasingly Southeast Asia) as major engines of global economic activity.¹⁴

Yet as noted by the International Energy Agency (IEA) and the World Bank, Asia’s auto boom cannot be entirely attributed to higher incomes and a growing desire for mobility; inefficient city planning and inadequate infrastructure investment have also played a role in amplifying demand as well as its consequences.¹⁵ Here, the example of Jakarta is particularly instructive. Between 1970 and 2016, more than five million people moved into Indonesia’s capital, doubling its size and contributing to rapid urbanization and extensive sprawl.¹⁶ Meanwhile, the city’s transit infrastructure struggled to advance comparable levels of development. Until recently, Jakarta was perhaps the largest city in the world without a metro,¹⁷ and as detailed in the *New York Times*, “[less than 320] of the capitol’s 4,500 miles of road have sidewalks,” leading some to opt for “cars, buses, taxis, and motorcycles to travel distances as short as 200 meters.”¹⁸

have not been technically or economically possible or desirable for transportation. This is not to indicate that many countries have not tried; rather that the results up until the last few years have been very modest.

¹¹ Philip Andrews-Speed, Mikkal E. Herberg, Tomoko Hosoe, John V. Mitchell and Zha Daojiong, “Oil and Gas for Asia: Geopolitical Implications of Asia’s Rising Demand,” *NBR*, September 2012, 3.

¹² *IEEJ*, “Asia/World Energy Outlook 2016,” 211.

¹³ *Ibid.*

¹⁴ *International Energy Agency (IEA)*, “World Energy Outlook 2017 Executive Summary,” (2017), https://www.iea.org/publications/freepublications/publication/WEO_2017_Executive_Summary_English_version.pdf, (accessed 27 April 2018): 1-2.

¹⁵ *IEA and the Economic Research Institute for ASEAN and East Asia (ERIA)*, “World Energy Outlook Special Report: Southeast Asia Energy Outlook,” (September 2013), http://www.iea.org/publications/freepublications/publication/SoutheastAsiaEnergyOutlook_WEO2013SpecialReport.pdf, (accessed 20 April 2018): 112.

¹⁶ *World Population Review*, “Jakarta Population 2018,” <http://worldpopulationreview.com/world-cities/jakarta-population/> (accessed 19 April 2018). Indeed, if you include the Greater Jakarta Metropolitan Area in this estimate, its population now stands at 30 million.

¹⁷ Nick Van Mead, “The World’s Worst Traffic: Can Jakarta Find an Alternative to the Car?” *The Guardian*, 23 November 2016, <https://www.theguardian.com/cities/2016/nov/23/world-worst-traffic-jakarta-alternative> (accessed 10 April 2018).

¹⁸ Joe Cochrane, “Jakarta, the City Where Nobody Wants to Walk,” *New York Times*, 20 August 2017, <https://www.nytimes.com/2017/08/20/world/asia/jakarta-walking-study-sidewalks.html> (accessed 19 April 2018).

Jakarta now has the world's worst traffic by some accounts, with the average commuter spending up to four hours in traffic each day.¹⁹

Jakarta's story is particularly stark, but similar stories about the relationship between urbanization and limited infrastructure in amplifying demand can also be seen in Delhi, Manila, and Bangkok, cities that are quickly climbing the ranks of those with the worst traffic in the world.²⁰ Worse still, such congestion is not only a visible indication of burgeoning overall demand, but can also exponentially increase environmental damage. "Congestion can increase the amount of pollutants emitted to three to five times the level in non-congestion scenarios," according to the World Health Organization.²¹ Congestion can also negatively impact the economic growth that increased flows of goods and people is supposed to enable, with the Asian Development Bank (ADB) estimating that Asian countries face annual GDP losses of 2–5 percent as a result of congestion.²² Consequentially, while expanded road-based transit has advanced the economic and social opportunities available to millions of people across Asia, it has also undeniably created new challenges for governments, industry, and the public.

The Energy Security Consequences of Asia's Auto Boom

If in its most basic form, energy security is about the search for supplies that can address four primary concerns—accessibility, affordability, geopolitical security, and environmental security—then a few observations about the energy security implications of Asia's auto boom are warranted, and should shape how we think about the road ahead. First, our understanding of what is likely and what is possible must factor in how tightly the oil-transportation nexus binds the outlooks of these two sectors to one another. It is not just that the primary use for oil is in the transportation sector, but also that the transportation sector is overwhelmingly reliant on oil. Thus increased motorization across the region has a strong correlation with Asia's rate of oil consumption growth.²³ This dynamic further intensifies debates about how to sustain economic progress and secure necessary supplies without resorting to zero-sum competition and conflict.

Second, in our economic assessment, we cannot necessarily assume that global oil prices closely track with how individual motorists across Asia think about the costs and benefits of taking to the road. Several countries across the region continue to subsidize or otherwise cap the domestic price of gasoline. Consequently, higher global oil prices may not be immediately felt by consumers at the pump. However, it should be said that

¹⁹ Nick Van Mead, *The Guardian*.

²⁰ Simon Roughneen, "Booming Southeast Asian Vehicle Sales Drive Urban Congestion," *Financial Times*, 29 May 2017, <https://www.ft.com/content/96608536-4204-11e7-9d56-25f963e998b2> (accessed 18 April 2018).

²¹ *World Health Organization*, "A Global Health Guardian: Climate Change, Air Pollution, and Antimicrobial Resistance," <http://www.who.int/publications/10-year-review/health-guardian/en/index1.html> (accessed 19 April 2018).

²² *Asian Development Bank (ADB)*, "Key Priorities: Urban Transport," (2017), <https://www.adb.org/sectors/transport/key-priorities/urban-transport>, (accessed 11 April 2018).

²³ Ashley Johnson, "Fuel Pricing and Subsidy Reforms in Asia: An Interview with Vandana Hari," *NBR* (5 December 2016), <http://nbr.org/research/activity.aspx?id=725> (accessed 27 April 2018).

this cost is still felt indirectly. As the level of subsidy required to keep domestic prices low rises, that money has to come from somewhere—meaning that governments can be torn between options to reduce spending in other areas (such as education, public health, and even critical transit system improvements), levying new or higher taxes, or racking up debt that can undercut further energy sector development.²⁴ As might be expected, such conditions can (and do) harm efforts to achieve national economic objectives, cause strife between governments and their people, and have even been the proximate cause for protests in India, Pakistan, and Indonesia.²⁵

Finally, if not well managed, the mass proliferation of automobiles will greatly exacerbate Asia's environmental challenges in ways that will need to be addressed. Chief among these concerns is air pollution, which in cities such as Beijing, Delhi, and Jakarta has already reached unbearable levels. Every year, outdoor air pollution is responsible for two million premature deaths across Asia.²⁶ While air pollution can be attributed to a number of factors, tailpipe emissions play an important role in driving overall levels, and in some Asian cities up to 80 percent of air pollution can be linked to urban transport.²⁷ Meanwhile, the IEA has noted that globally, the transportation sector is not on track to meet reduction targets and support efforts to limit average global temperature increases to no more than two degrees Celsius over the next century. Studies suggest that increases beyond two degrees will significantly increase the likelihood of more dire climate change scenarios.²⁸ Thus, without more robust industry and policy efforts to reshape transportation, global climate efforts will almost certainly fail.

²⁴ Ashley Johnson, "Fuel Pricing and Subsidy Reforms in Asia: An Interview with Vandana Hari," *NBR* (5 December 2016), <http://nbr.org/research/activity.aspx?id=725> (accessed 27 April 2018). The historical impact of Indonesia's subsidies is one case in point. For more, see Natalie Bravo, Clara Gillispie, Mikkal E. Herberg, Hanan Nugroho, Alexandra Stuart, and Nikos Tsafos, "Indonesia: A Regional Energy Leader in Transition," *NBR* (December 2015), http://nbr.org/publications/specialreport/pdf/sr53_indonesia_dec2015.pdf (accessed 27 April 2018).

²⁵ Heather Timmons and Hari Kumar, "Protests Over Fuel Costs Idle Much of India," *New York Times*, 5 July 2010, <https://www.nytimes.com/2010/07/06/world/asia/06india.html> (accessed 27 April 2018); Michael Kugelman, "Pakistan's Energy Crisis: From Conundrum to Catastrophe?" *NBR* (13 March 2013), <http://www.nbr.org/research/activity.aspx?id=323> (accessed 27 April 2018); Wendy Culp, "Pakistan's Energy Insecurity: Anatomy of a Crisis and How to Move Forward: An Interview with Michael Kugelman," *NBR* (22 July 2015), <http://www.nbr.org/research/activity.aspx?id=588> (accessed 27 April 2018); Joe Cochrane, "Crowds Protest as Indonesian Lawmakers Raise Fuel Prices," *New York Times*, 17 June 2013, <https://www.nytimes.com/2013/06/18/business/global/indonesia-budget-fuel-prices.html> (accessed 27 April 2018).

²⁶ IEA, "Energy and Air Pollution," 2016, <https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlookSpecialReport2016EnergyandAirPollution.pdf> (accessed 27 April 2018): 35.

²⁷ *Ibid.*; ADB, "Key Priorities: Urban Transport," (2017).

²⁸ Srikanth Shastry and Madhav Pai, "The Role of Transportation in the Future of Urban Developing Asia: A Case Study of India," *NBR 2016 Pacific Energy Summit* (2016) http://nbr.org/downloads/pdfs/eta/pes_2016_working_paper_Shastry_Pai.pdf (accessed 11 April 2018)" 2.

Asia's Transportation Imperative: Managing Competing National Aims

The scale and intensity of the challenges presented by rapid motorization in Asia have led governments to look at how to more fully incorporate robust responses into their thinking about energy security. Generally speaking, the IEA notes that countries can deploy various tactics to “avoid, shift, and improve” the way that transportation systems are used.²⁹ Directly addressing how to reduce fears about oil supply insecurity contributing to regional conflict also remains key. With these major goals in mind, several countries have developed comprehensive national energy plans and industrial policies that treat transportation as both a strategic challenge for policymakers, requiring coordination across sectors and ministries, and an opportunity to take on new leadership. Notable examples include China's series of five year plans on energy and the environment as well as “Made in China 2025;” Japan's Basic Energy Plan and its Quality Infrastructure Initiative; “Make in India;” and Thailand's Integrated Energy Blueprint; as well as various national initiatives designed to harness the potential of the fourth industrial revolution.³⁰ Meanwhile, regional fora such as the Association of Southeast Asian Nations (ASEAN), Asia-Pacific Economic Cooperation (APEC), and the East Asia Summit (EAS) have dedicated working groups to identifying regional best practices on strengthening transportation and energy security. The next four sections look at the execution of these visions in terms of particular strategies and approaches, while highlighting areas of untapped potential.

Designing and Shaping Demand

As noted earlier, an important factor sharpening the intensity of Asia's auto boom is that the region's existing infrastructure is insufficient; depending on the locale, infrastructure may need to be expanded or even redesigned. Yet the now infamous images of sprawling bicycle graveyards in China are just one example of how new development can fail when there is disconnect between policy incentives and local need.³¹ With this in mind, Shastry and Pai have argued that if decision-makers want to have the greatest impact in advancing more sustainable systems, they should first analyze the local conditions that can make certain forms of transportation more or less likely to be used. For example, analyzing population density in a particular area as well as how many miles

²⁹ IEA, “A Tale of Renewed Cities,” (2013), http://www.iea.org/publications/freepublications/publication/Renewed_Cities_WEB.pdf (accessed 20 April 2018): 43-45). ADB's “Avoid, Curb, Transit” provides a similar approach: Sharad Saxena, “ACT now to avoid being stuck in traffic,” Asian Development Blog, *ADB* (24 June 2016), <https://blogs.adb.org/blog/act-now-avoid-being-stuck-traffic> (accessed April 19, 2018).

³⁰ The fourth industrial revolution is characterized as a building upon of the emergence of the digital age, “blurring the lines between the physical, digital, and biological spheres” as described by Klaus Schwab and the World Economic Forum. Klaus Schwab, “The Fourth Industrial Revolution: What It Means, How to Respond,” *World Economic Forum* (14 January 2016), <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> (accessed 13 May 2018).

³¹ Alan Taylor, “The Bike-Share Oversupply in China: Huge Piles of Abandoned and Broken Bicycles,” *The Atlantic*, 22 March 2018, <https://www.theatlantic.com/photo/2018/03/bike-share-oversupply-in-china-huge-piles-of-abandoned-and-broken-bicycles/556268/> (accessed 26 April 2018).

are covered in a community's average daily commute can help planners avoid pitfalls in overbuilding of highways, subways, or even bicycle sharing systems.³²

Once decision-makers are better positioned to make investments that avoid 'one-size fits all' approaches, integrating transit and land developing planning processes can further enable a more comprehensive understanding of real costs and trade-offs of various plans, ultimately promoting better demand management. This integrated planning approach is a key part of the idea of transit-oriented development,³³ and has been increasingly elevated as an important strategy across Asia.

One positive outcome of transit-oriented development is that many countries in Asia are now experimenting with Bus Rapid Transit (BRT) systems, which can move more people than private automobiles yet have a smaller physical and financial footprint than light or underground rail projects;³⁴ China in particular has introduced more BRT systems into more cities than any other country in Asia.³⁵ Meanwhile, Singapore has also had strong success in using the principles of transit-oriented development to make decisions about its long-term investments, given the strong premium on its limited land. The city-state is now home to one of the world's most efficient public transit systems.³⁶

Finally, to further accelerate popular shifts to new transit options, governments are also experimenting with ways to nudge individuals toward limiting their reliance on personal automobiles. For example, major cities such as Delhi and Beijing have implemented restrictions on when and how private cars can take to the road, with fines and other punishments for those who use theirs on prohibited days.³⁷ Singapore has alternatively placed a cap on the net number of new vehicle registrations that can be approved in a given year—set to decline to 0 percent by the end of 2018.³⁸ And while

³² Shastry and Pai, "The Role of Transportation in the Future of Urban Developing Asia: A Case Study of India," 5.

³³ That is, the idea that development can and should prioritize planning that focuses on making urban areas more well-connected, walkable, and bikeable to more sustainably address individual transit needs.

³⁴ Christina Olsen, "Interview with Dan Chatman: Integrating Pre-Existing Public Transportation with Bus Rapid Transit in Developing Cities," *Meeting of the Minds*, (29 November 2016), <http://meetingoftheminds.org/interview-dan-chatman-integrating-pre-existing-public-transportation-bus-rapid-transit-developing-cities-17634#prettyPhoto> (accessed 11 April 2018).

³⁵ Robert Cervero, "Bus Rapid Transit (BRT): An Efficient and Competitive Mode of Public Transport," *ACEA* (December 2013), http://www.acea.be/uploads/publications/20th_SAG_HR.pdf (accessed 27 April 2018): 6.

³⁶ Louise Lucas, "Singapore Seeks to Export Own Model," *Financial Times*, 29 July 2015, <https://www.ft.com/content/2adc8d68-20a6-11e5-aa5a-398b2169cf79> (accessed 2 April 2017). Via unpublished paper by Matt Mingey: "Island Lessons: The Singapore Model and Chengdu's Transit Development."

³⁷ Sylvester Monroe, "7 Cities that Fight Air Pollution with Driving Restrictions," *Washington Post*, 8 December 2015, https://www.washingtonpost.com/news/worldviews/wp/2015/12/08/7-cities-that-fight-air-pollution-with-driving-restrictions/?utm_term=.f5a02a60326d (accessed 11 April 2018).

³⁸ Patrick Caughill, "Singapore Will Stop Adding New Cars to Its Roads in 2018," *Futurism*, 23 October 2017, <https://futurism.com/singapore-will-stop-adding-new-cars-to-its-roads-in-2018/> (accessed 11 April 2018).

planners and observers are right to question whether some of the tax and regulatory incentives for developing bike sharing systems have been overly attractive, the increased availability of these systems has nonetheless had a positive impact in checking excessive driving. As reported by Reuters, studies of Shenzhen found that the city's bike sharing systems had reduced "nearly 10 percent of travel by private car or 13 percent of gasoline consumption," while informal surveys conducted in Beijing, Seoul, Taipei, and Singapore suggest that available systems have genuinely encouraged individuals to minimize their frequency of travel by motorized transit.³⁹

Pairing Technology and Policy to Manage Fuel Efficiency and Vehicle Emissions

Next, to account for when oil demand and emissions cannot be dampened through reducing distances traveled, countries across Asia are also looking to increase vehicle efficiency standards.⁴⁰ Much like the efforts immediately following the oil shocks of the 1970s, many recent pushes could be seen as going hand-in-hand with the desire to alleviate concerns over exposure to high oil prices or volatile markets; the Japanese government's significant funding assistance in 2014 for the development of next-generation engines in a period of painfully high oil prices provides one example.⁴¹

However, even after oil prices began to crash in mid-2014, policy and industry momentum on advancing energy efficiency initiatives has remained resilient.⁴² This is partly because such initiatives often also well-align with popular calls to reduce air pollution and address environmental security concerns more broadly; over the past decade, a rising percentage of the public in countries across Asia have described climate change as a "major threat," according to surveys by Pew,⁴³ while leaders in major economies like China, Japan, and India have all touted such progress as strategic national priorities, providing political cover for additional policy and industry efforts. And it is also important to credit that as Southeast Asia continues to increase in significance as an

³⁹ Jessica Jaganathan and Florence Tan, "Two Wheels Good: Bike Boom Nibbles on Asia Gasoline Demand Growth," *Reuters*, 26 September 2017, <https://www.reuters.com/article/us-asia-bicycles/two-wheels-good-bike-boom-nibbles-on-asia-gasoline-demand-growth-idUSKCN1C10ZJ> (accessed 26 April 2018). Jessica Jaganathan and Florence Tan, "Bike-Sharing Takes Off Among Youths in Major Asian Cities: Survey," *Reuters*, 26 September 2017, <https://www.reuters.com/article/us-asia-bicycles-survey/bike-sharing-takes-off-among-youths-in-major-asian-cities-survey-idUSKCN1C110F> (accessed 26 April 2018).

⁴⁰ Clara Gillispie, Ashley Johnson, and Laura Schwartz, "2016 Pacific Energy Summit Report: Sustainable Futures: Energy and Environmental Security in Times of Transition," *The National Bureau of Asian Research* (2017), http://nbr.org/downloads/pdfs/eta/PES_2016_report.pdf (accessed 19 April 2018): 37.

⁴¹ Hans Greimel, "Japanese Collaborate on R&D for New Fuel Efficient Engines," *Automotive News*, 19 May 2014, <http://www.autonews.com/article/20140519/OEM04/140519876/japanese-collaborate-on-r%26d-for-new-fuel-efficient-engines> (accessed 21 April 2018).

⁴² This is partly because such initiatives often also well-align with popular calls to accelerate progress on environmental security and air pollution concerns.

⁴³ Jacob Poushter and Dorothy Manevich, "Globally, People Point to ISIS and Climate Change as Leading Security Threats," *Pew Research Center* (1 August 2017), <http://www.pewglobal.org/2017/08/01/globally-people-point-to-isis-and-climate-change-as-leading-security-threats/> (accessed 23 May 2018).

engine of energy demand growth, stakeholders are championing discussions of energy efficiency in high-level regional dialogues, and in turn, governments across Southeast Asia are translating recommendations into practice. For example, in a 2017 review of initiatives taking place across Southeast Asia, the IEA and ERIA detailed that a number of countries in the region are working to advance fuel efficiency and mitigate pollution, and using a variety of mechanisms based on varying domestic goals.⁴⁴ Such efforts include offering tax reductions for those who purchase vehicles that hit targets for overall fuel consumption (Thailand); offering rebates for purchasing high-efficiency cars (Singapore); and pushing for requirements that domestic industries adopt higher, international standards for fuel efficiency and pollution management (multiple).⁴⁵

Yet even so, such programs represent ambition below their full potential. In reviewing the aggregate impacts of policies being pursued, the same IEA/ERIA report argued that Southeast Asia's transport sector would tap just 25 percent of possible, economically viable energy efficiency gains.⁴⁶ Additionally, even after policies are mandated, proper enforcement and complete adoption can remain a challenge, as Vandana Hari has well documented. This is the case even in major markets such as China and India, where policymakers have executed ambitious enforcement campaigns and have also articulated clear desires to transform their domestic automotive manufacturers into internationally competitive brands (where meeting higher benchmarks for fuel efficiency and emissions is often a prerequisite to breaking into European and American markets).⁴⁷ This suggests that even if improving efficiency can be the 'low-hanging fruit' in a country's effort to boost its energy security outlook, it may nonetheless require dedicated leadership and long-term focus to achieve real gains.

Breaking the Oil-Transportation Link

Meanwhile, in terms of reshaping overall transportation sector outlooks, several observers have noted that automobiles occupy a space that is especially ripe for disruption given a growing range of viable switching options. Consequently, governments and industry have identified greater leadership in driving innovation as a key opportunity to support local economic growth and job creation. For example, regional gatherings such as the EAS⁴⁸ as well as national initiatives in select countries have examined opportunities for biofuels to play a more prominent role as a fuel source, strategies that could reduce transportation-linked demand for oil and support domestic agriculture jobs.⁴⁹ India has also experimented with increasing the role of natural gas in its mass transit

⁴⁴ IEA and ERIA, "Southeast Asia Energy Outlook," 97.

⁴⁵ Ibid.

⁴⁶ Ibid, 112.

⁴⁷ See also Vandana Hari's work.

⁴⁸ Association of Southeast Asian Nations (ASEAN), "Joint Ministerial Statement of the Sixth East Asian Summit Energy Ministers Meeting (6th EAS EMM)," *ASEAN* (12 September 2012), <http://asean.org/joint-ministerial-statement-of-the-sixth-east-asian-summit-energy-ministers-meeting-6th-eas-emm/> (accessed 27 April 2018).

⁴⁹ Kaoru Yamaguchi (ed.), "Study on Asian Potential of Biofuel Market," *ERIA* (November 2014), <http://www.eria.org/RPR-FY2013-20.pdf> (accessed 27 April 2018) 9.

systems as a strategy for reducing transportation-linked air pollution.⁵⁰

Additionally, the potential of new energy vehicles (NEVs)—a category that includes plug-in hybrid, battery, and fuel-cell electric vehicles—has captured the imagination of both governments and industries. While zero-emission vehicles still represent only a small fraction of total global automotive sales, their disruptive potential is immense. As one capture of the transformative potential of these vehicles, recent modeling from IEEJ has indicated that, “if global new vehicle sales are limited to zero-emission vehicles...Global oil demand will peak out around 2030.”⁵¹ Consequently, China in particular has championed the development and diffusion of NEVs in its strategic national plans (such as *Made in China 2025*), and Japan and South Korea have also advanced robust national targets for domestic sales and adoption.⁵² Much like national efforts focused on improving efficiency and strengthening city planning, such efforts regularly combine an array of tools, including rebates, tax credits, and incentives for public-private partnerships, at times blurring the line between energy security and industrial policies. Meanwhile, to further incentivize NEV adoption and other switching efforts, countries including China and India are going as far as setting target dates for banning standard combustion vehicle sales, or at least when companies are required to have a certain share of their overall sales classified as NEVs if they want to be eligible to sell domestically, though it remains unclear to what extent national policymakers will press for follow through.⁵³

⁵⁰ Tim Gould and Christophe McGlade, “Commentary: The Environmental Case for Natural Gas,” *IEA*, (23 October 2017), <https://www.iea.org/newsroom/news/2017/october/commentary-the-environmental-case-for-natural-gas.html> (accessed 27 April 2018); IEEJ, “Asia/World Energy Outlook 2016: Consideration of 3E’s+S Under New Energy Circumstances in the World.”

⁵¹ Koyama, 2.

⁵² Marika Heller, “Chinese Government Support for New Energy Vehicles as a Trade Battleground,” *NBR* (27 September 2017), <http://www.nbr.org/research/activity.aspx?id=805> (accessed 19 April 2018). “Guowuyuan: Zhengfu bumen ji gonggong jigou xingou xinnengyuan qiche bili yao chao 50%” [State Council: For Government and Public Organizations NEVs as Proportion of New Purchases Will Surpass 50%], *Caijing*, 24 February 2016, <http://industry.caijing.com.cn/20160224/4074093.shtml> (accessed 27 April 2018). Additionally, while this section has primarily focused on government action, industry and market commitments to transformation undeniably play a critical role in driving innovation. For example, recognizing this market opportunity (and the peril of losing out on market share), Honda announced that it intends for two-thirds of its automobile sales to be electrified in 2030, while the Renault-Nissan-Mitsubishi alliance plans to introduce twelve models of EVs by 2020 and set a target that 30 percent of its total sales in that year will be EVs. Honda, “Summary of Honda CEO Speech at Honda Meeting 2017,” *Honda News Releases* 2017, 8 June 2017, <http://world.honda.com/news/2017/c170608eng.html> (accessed 27 April 2018); Julia Pyper, “Nissan-Renault Insists It’s ‘Not Going to Relinquish’ Leadership on Electric Mobility,” *Greentech Media*, 12 January 2018, <https://www.greentechmedia.com/articles/read/nissan-renault-leadership-electric-mobility-ces#gs.GZktrOQ> (accessed 27 April 2018).

⁵³ Alanna Petroff, “These Countries Want to Ban Gas and Diesel Cars,” *CNN Money*, 11 September 2017, <http://money.cnn.com/2017/09/11/autos/countries-banning-diesel-gas-cars/index.html> (accessed 21 April 2018); Melissa Lynes, “Projecting light-duty electric vehicle sales in the National Energy Modeling System (NEMS) and World Energy Projection System plus (WEPS+),” (Presentation for 2017 EIA Energy Conference, Washington, D.C., 27 June 2017), https://www.eia.gov/conference/2017/pdf/presentations/melissa_lynes.pdf (accessed 25 May 2017). Authors’ own interviews.

These examples are not to say that breaking the oil-transportation link should be viewed as the be-all, end-all solution to the energy and environmental security challenges stemming from Asia's auto boom. As explored by IEEJ, greater adoption of zero-emission vehicles could generate significant additional demand for electricity—raising total final global consumption by 12 percent under some scenarios. To the extent that electricity generation in Asia remains coal-dominant, zero-emission vehicles could still contribute (albeit indirectly) to rising air pollution and CO₂ emissions.⁵⁴ This is not to mention that the processes and technologies involved in the creation of next-generation vehicles can also introduce new venues for competition; concerns over China's dominance of the market for critical rare earth elements are just one case in point. Thus transformation may not eliminate energy and resource insecurities, but rather repackage how they manifest.

In Case of Emergency: If not Peak Oil Demand, Then What?

This raises an important final point: how can Asia better address its anxieties about energy insecurity once efforts to 'avoid, shift, or improve' the overall level of demand are already exhausted? Indeed, while all of these strategies play important roles, the IEA, IEEJ, and ADB all anticipate that oil will remain the dominant fuel behind Asia's auto boom through at least 2050.

In one sense, scenarios for advancing regional progress on collaborative oil security efforts have improved dramatically over the past several years. The emergence of major new suppliers – including a growing potential role for the United States -- has contributed to both new production sources and an overall more diversified supplier map, reducing some of the potential political drivers of tensions. In a major, two-year study, the National Bureau of Asian Research found that these conditions have created a window of opportunity for policymakers and industry to take action along a number of lines. Such actions could include building regional stockpiles to minimize the impact of future market disruptions, conducting joint security operations to reduce risks at particular transit choke points (such as the Straits of Hormuz or Malacca) and clarifying regional best practices in domestic reforms that better enable market signals that can rebalance supply and demand.⁵⁵ While undertaking such efforts will not be easy, regional breakthroughs on collaborations in other domains show that it can be possible to balance strategic, economic, and environmental sensitivities. These include formalized progress between India and Bangladesh on trans-boundary water sharing and management⁵⁶ and regional cooperation on anti-piracy campaigns and other maritime security challenges, models which could be reviewed as potential templates for how to develop regional trust and collective action.

⁵⁴ IEEJ, "IEEJ Outlook 2018," 9.

⁵⁵ Mikal E. Herberg, "U.S., Japanese, and Asian Energy Security in a New Energy Era," *NBR*, April 2015, http://www.nbr.org/publications/specialreport/pdf/sr51_asianenergysecurity_april2015.pdf (accessed 27 April 2018).

⁵⁶ *NBR*, "2016 Pacific Energy Summit Report," 12.

To move forward effectively, Asia also needs robust, comprehensive frameworks that can sustain regional dialogue and action on energy security. The IEA has taken difficult and commendable steps to bring in a greater range of Asian countries as members and associates—but it remains a forum where not everyone has a seat at the table during decision-making, which can hinder efforts to ensure that ideas can be translated into specific, well-coordinated region-wide initiatives that take into account varying political and economic conditions.⁵⁷ As explored by Cutler, there are a number of ways that the region could look to address this deficiency, including through pushing for further membership reforms in existing energy security groupings like the IEA; further expanding the technical capacity of existing regional groupings such as the East Asia Summit or APEC; or creating an entirely new organization. These need not be viewed as mutually exclusive options, but it is important to note where significant progress is already underway. This includes commendable steps by the East Asia Summit process to develop a comprehensive, multi-year strategy for strengthening Asian energy security that builds on many of the recommendations above while engaging both Asian and broader international stakeholders.

Greater levels of regional cooperation can help countries to achieve outcomes that might otherwise be economically or technically prohibitive to pursue on an individual basis. Yet to the extent that we may be returning to an era of higher prices with a near-term supply crunch potentially on the horizon, moving toward regional cooperation now could have significant long-term benefits. There is a clear risk that the current era of relative abundance could result in complacency, allowing energy security competition to potentially rise to the surface again in the future. Therefore, countries must move forward now and embrace the potential of cooperation, despite the significant amount of hard work that this will entail.

Conclusion

Can countries across the Asia-Pacific make significant, sustained progress on each of these fronts? And if so, will it be enough to reduce energy insecurity and prevent environmental disaster? As this essay has shown, there are a number of ways that countries can move the needle toward 'yes.' Yet greater certainty of success will likely require significant leadership, long-term commitment, and regional coordination. Certainly, governments can play a positive role in shaping and responding to the challenge of ensuring that Asia's auto boom does not sacrifice the region's energy and environmental security. However, stronger action must be taken now to turn this potential into a new reality.

⁵⁷ For more on this point, see: Tom Cutler, "The Architecture of Asian Energy Security," in Mikkal E. Herberg, Roy Kamphausen, Tsutomu Toichi and Tom Cutler, "Adapting to a New Energy Era: Maximizing Potential Benefits for the Asia Pacific," *NBR*, September 2014 (accessed 27 April 2018); and Mikkal E. Herberg, "U.S., Japanese, and Asian Energy Security in a New Energy Era," in Mikkal E. Herberg, Roy Kamphausen, Tsutomu Toichi and Tom Cutler, "Adapting to a New Energy Era: Maximizing Potential Benefits for the Asia Pacific," *NBR*, September 2014 (accessed 27 April 2018).

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