Natural Resource Governance Institute

The Risks of Depending on Gas Imports

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Module 2

This slide deck accompanies the second module of the Natural Resource Governance Institute's (NRGI) Framework for Countries Evaluating Gas-to-Power Pathways. The framework is a resource for government officials, researchers, civil society actors and journalists in lower- and middle-income gas-producing countries. It offers insights, arguments, questions, data points and examples for interrogating common claims around the use of gas for electricity.

In particular, the second module evaluates the claim that producing and burning gas will help a country achieve "energy security."

With respect to imported gas, the following slides:

↘

Outline some basic issues and choices that governments should wrestle with before supporting gas imports.

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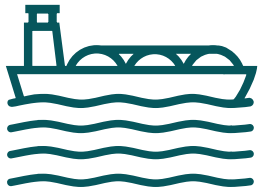
Survey some of the possible socioeconomic risks and costs of dependence on imported gas, using country examples.

Gas-producing countries can choose to import gas in response to a range of circumstances.

These include:



Domestic gas production is declining or too small to meet demand (Bangladesh, Colombia, Pakistan, Philippines)



Most or all the country's gas production is exported (Egypt, Indonesia, Malaysia)



Imports are cheaper and faster than increasing domestic production (Mexico)



Gas production has not yet started; imports are seen as a stopgap (Ethiopia, Lebanon, Senegal)

Politicians often cite “energy security” as a reason to import gas.

Two typical examples:



Ghana

The President argued that building a liquified natural gas (LNG) import terminal showed his government’s commitment “to providing Ghana with constant, reliable and affordable power supply.”



Mexico

The Federal Electricity Commission (CFE), Mexico’s state-owned utility, justified building six new power plants that would run on imported gas by saying they would “guarantee the country’s energy security.”

When government officials say they intend to use gas for "energy security," they may have one or more of five common goals in mind.

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1

Sufficient energy supply

Ensuring the country has enough energy to meet demand.

2

Uninterrupted energy supply

Avoiding sudden shortages in supply—e.g., those caused by war, violent conflict or political instability, either at home or abroad, or from other power sources like renewables that cannot produce electricity all the time.

3

Lower energy sector costs

Making energy cheaper for households and businesses and reducing the energy sector's toll on public finances and the economy.

4

Stable energy prices

Protecting consumers and the economy against volatile international energy prices.

5

Energy sovereignty

Insulating domestic energy choices from foreign politics, interests and norms.

Some lower- and middle-income gas producing countries will need to keep using gas—at least for a while.

If a country has already built domestic gas infrastructure, it cannot just suddenly switch it off without causing energy shortages.

- *Colombia's* Remaining gas reserves could be exhausted in 7 years, but the country has 7,762 kilometers of gas pipelines, 17 gas power plants, 620,000+ gas-powered vehicles, and 65 percent of households (33 million people) connected to the national gas service.

Energy transitions don't happen overnight. Building a new energy system takes huge amounts of capital, human effort, mindset change and time.

- The *U.K.'s* transition away from coal took over a half-century.

Contracts, laws, economics, and a range of problems with decision-making can lock countries into using existing infrastructure. For example, most gas infrastructure requires two to three decades of operation to become cost-effective, and if it is privately financed, a government will likely have to sign contracts that contain penalties for underutilization to facilitate the initial financing.

Countries may need some gas power to stabilize the grid as renewables grow—though this is not necessarily true for all countries.

Renewables costs are declining, but for now, gas-fired power may still be cheaper for some lower- and middle-income gas producers.

Renewables like solar and wind make electricity. At least until other alternatives (e.g., green hydrogen) become viable, renewables cannot provide all that gas can. Examples:

- Feedstock for making ammonia, methanol, fertilizers, plastics or other petrochemicals
- Heat for industrial processes like manufacturing cement, processing minerals, producing iron, steel and other metals
- Fuels for cooking and refrigeration such as liquified petroleum gas
- Condensates and byproducts like pentane that can be blended with gasoline and other refined fossil fuel products

But no one should assume that greater reliance on gas will bring "energy security."

Use of the term can shut down, confuse or capture debate, blocking serious consideration of the issues, for several reasons:

"Energy security" is a vague, sometimes misleading term.

It has many possible meanings. (Note the five common goals above.) Are all voices in the debate even talking about the same thing?

"Energy security" can be a charged, emotive term.

It plays to biases and fears. After all, who doesn't want "security"? It may encourage overly simplified, reactive thinking. In some gas-producing countries (especially in Africa), energy security rhetoric feeds into the heated argument about whether lower-income countries have a "right" to keep exploiting their gas reserves, given their limited responsibility for climate change.

Appeals to "energy security" can reflect other interests.

Voices touting gas as a vehicle for energy security can have their own agendas. Is what they want also good for the country?

- **National oil companies (NOCs):** In a 2023 NRGI analysis of NOC statements and publications, many said they want to invest more in gas to "diversify" away from oil, in part to ensure their own survival.
  - So far, though, most are struggling to shift their business models. Some NOCs are also using the global transition away from fossil fuels to justify more (and riskier) investments in extraction.
- **Private oil and gas companies:** Some are using energy security arguments to lobby for more gas extraction in lower- and middle-income countries.
  - Companies want to focus more on gas as "peak oil" approaches. E.g., Eni plans for gas to constitute 90 percent of its fossil fuel production by 2050, up from 46 percent in 2022.
  - Many international companies are more interested in extracting gas for export than for domestic use in the countries of production.

Governments should be extremely cautious about tying their constituents to imported gas.

Not every deal to import gas will undermine a country's energy security.

But relying on foreign gas ties a country's energy system to many forces and events outside of a government's control. This can have serious socio-economic consequences when:

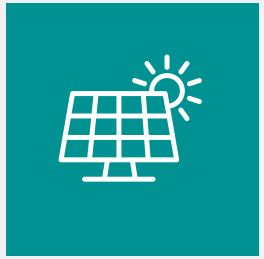
The costs of importing gas rise.



There is a shortage of imported gas.



In the worst cases, this can send shockwaves through economies and upend people's daily lives.





Just because a country has the option to import gas doesn't make it the best fuel for electricity, especially if the government, private companies and electricity users can invest in alternatives to gas power, such as solar or wind. Both solar and wind come with their own challenges, but compared to gas, they can offer lower risks and growing advantages for achieving energy security.

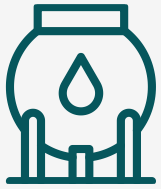
Energy sector officials should weigh the differing risks of piped gas and LNG.

Countries can import gas in two ways:



Piped gas:

Dry gas that was extracted in another country travels through a cross-border pipeline.



Liquified natural gas (LNG):

Foreign gas that is cooled and shrunk into a liquid form, then transported by ship.

Not every country can do both, due to geography. Pipeline gas is generally only possible for countries with gas producers next door or in their region. LNG imports can be difficult for landlocked countries.

Piped gas and LNG can have different energy security implications and risks. Each country's situation is unique, but here are some common considerations and rules of thumb, organized by the five common goals of energy security.

Sufficient energy supply

1

LNG imports can be better for countries that need flexibility—e.g., because short-term domestic gas demand fluctuates or long-term demand is uncertain. There are several common reasons for this:

Floating regasification and storage units (FRSUs) and power barges that burn gas for electricity generation are often cheaper to build/rent than pipelines. Operators therefore are under less pressure to run them at full capacity

- LNG is more compatible with more on one-off, small volume (“spot”) sales than piped gas. (See below for discussion of “spot” versus “term” sales.)
- The importing country can buy from a range of sellers as needed, though there are limits (e.g., price, geographic distance, competition)

Pipelines can provide more regular long-term supply of stable volumes—if the countr(ies) at the other end of the line deliver what they promise.

- **Ghana:** Made plans to start importing LNG after the gas it received through the West Africa Gas Pipeline was a fraction of what suppliers in Nigeria agreed to deliver.

Uninterrupted energy supply

2

Here the choice between LNG and piped gas depends partly on the type of threat to supply:

Falling domestic gas production. LNG import facilities can be quicker to build and easier to finance than new gas pipelines. This means that a country can commence imports sooner if it faces a looming domestic gas shortage.

- **Africa.** Countries are planning 23,932 kilometers of new gas pipelines at a cost of $89 billion. Only 8 percent of the pipeline (1,872 kilometers) is sufficiently funded for construction to start.
- Large regional pipelines can run years behind schedule with little or no tangible progress (e.g., Nigeria-Morocco pipeline, EastMed pipeline).
- But FRSUs can also be delayed for years due to funding issues, domestic politics, uncertain demand (Ghana, Philippines).

Interruptions caused by violent conflict or political instability. The extent of disruption depends on the nature and location of the problem.

- Unrest in other countries/regions can affect supplies of both piped gas and LNG. For piped gas, the unrest in a country that supplies or hosts the pipeline can result in disruption to supply. Unrest anywhere in the world can disrupt supply of LNG, since it is a globally traded commodity.
- Domestic insurrection/conflict can result in attacks to gas pipelines, as they are long and hard to police. Rebel or separatist groups have used attacks (or the threat of attacks) as a negotiating tactic.
  - **Nigeria.** Armed groups in the Niger Delta regularly vandalize and attack gas supply pipelines. The reasons behind the incidents vary and can have little to do with energy supply.

Uninterrupted energy supply

2

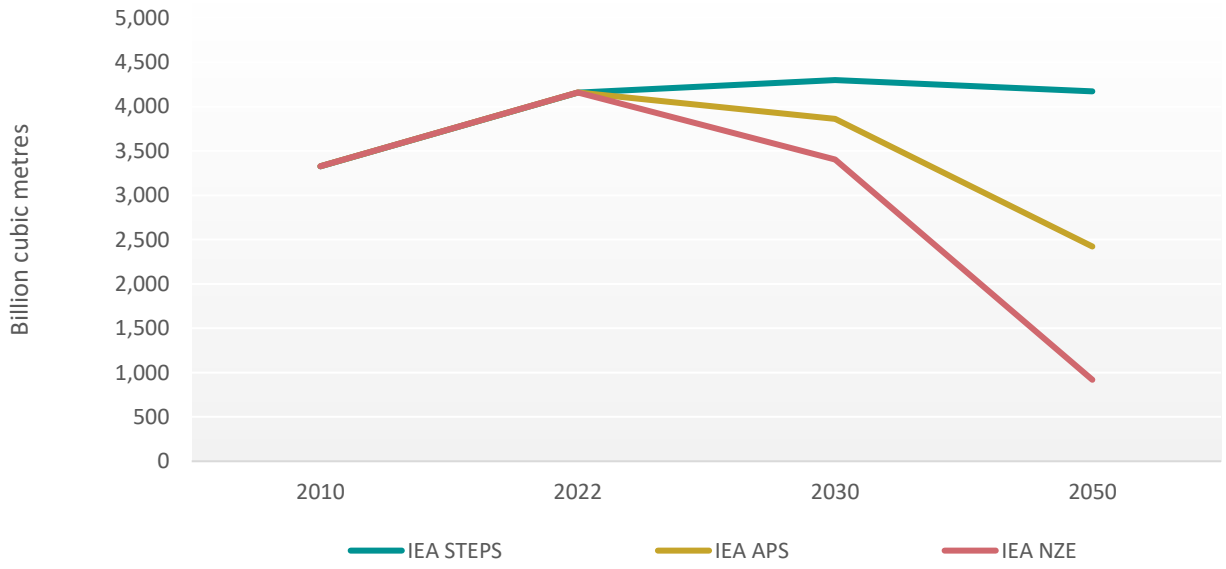
Global gas shortage. Pipeline imports can be less affected by a global shortage, though there are exceptions.

Some reasons why:

- LNG is traded globally. Competition during shortages can be fierce. For a picture of how depending on LNG during a shortage can harm a country, see slides 18-20, below.
- Future global gas demand is highly uncertain. There are many competing, dramatically different predictions (see graph opposite).

Source:
EA World Energy Outlook 2023

Global gas demand in different IEA scenarios, billion cubic meters (bcm)



Uninterrupted energy supply

2

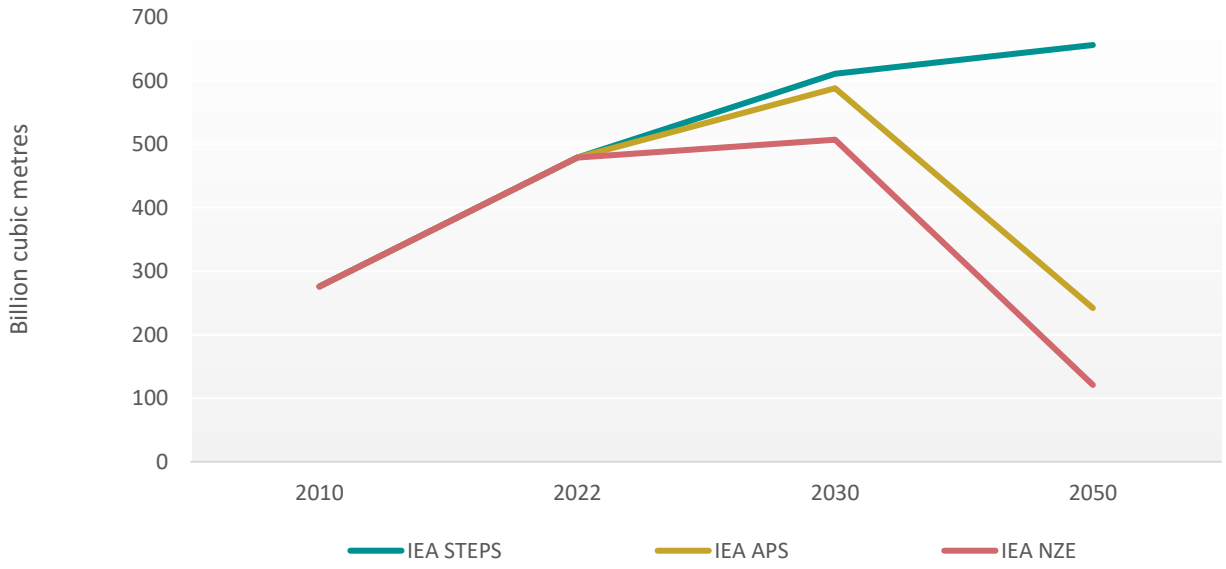
Global gas shortage. Pipeline imports can be less affected by a global shortage, though there are exceptions.

Some reasons why:

- Predictions for LNG exports also vary significantly (see graph opposite).
- Short-term availability of LNG isn't much easier to predict. Markets have gone through extreme cycles of shortage and surplus in the last decade. Analysts often don't see them coming.

Source: Rystad

Global LNG inter-regional trade in different IEA scenarios, bcm



Lower energy sector costs

3

Reliance on imported gas can incur different types of costs:

Gas sale prices

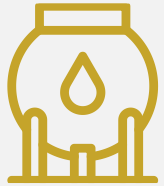
LNG sale prices are often higher than piped gas in many markets, though there are exceptions. This is often because the LNG supply chain comes with extra costs (e.g., liquification, transport by ship, regasification).

Infrastructure costs:



Piped gas:

Transnational pipelines supply gas to the domestic pipeline network for onward distribution.



LNG:

Most lower- and middle-income gas producers receive LNG through FRSUs, which then feed the gas into the domestic pipeline network for onward distribution or directly into power barges.

Lower energy sector costs

3

What happens when a country builds gas import infrastructure that it doesn't need or cannot use?

- **Vietnam and Philippines.** Both countries are building multiple FRSUs to replace coal in power generation, avoid blackouts and respond to forecasts of rising gas demand. But NGOs and industry analysts warn some terminals could operate far below capacity and others may be cancelled. The reason is that renewables are growing quickly and could be cheaper, especially since neither country has found anyone willing to sell them gas on a term basis with stable prices. In both countries, multi-year delays building new gas-fired power plants and concerns about high spot prices also cut demand.
- **Senegal** has had a 220 MW floating power ship since 2019. Initially using heavy fuel oil, authorities planned to switch the ship to LNG in 2022. However, high LNG prices have delayed this change.

Environmental costs

Pipelines can lock a country into emitting methane and other dangerous pollutants for longer because they have long running lives (50+ years). FRSUs and power barges tend to operate for much less time (10-15 years).

Costs to the wider economy: See slides XX-XX for examples.

Stable energy prices

4

Compared to pipeline imports, relying on foreign LNG can leave a country dramatically more exposed to volatile world energy prices.

This is especially a risk for a country that shifts from burning its own gas to imports. LNG is a globally traded commodity. Prices are more tied to—and affected by—events abroad. The importing country often will not have influence over such developments.



Changes in supply: Amounts of LNG in overseas storage may be affected by breakdowns or strikes at foreign LNG plants.



Changes in demand: Levels of industrial gas use in other countries may be affected by new energy efficiency measures.



Changes in related market prices: Price fluctuations in foreign utility and natural gas futures markets could affect importers.



Changes in legal and contract terms: Other countries or investors may impose new fiscal duties, decarbonization measures or sanctions on LNG production and sales.



Changes in transport costs: Freight costs, insurance rates or pipeline tariffs may rise.



Changes in foreign investment decisions: Companies may announce, postpone or cancel LNG projects.



Changes in security: Foreign wars, violent conflict, maritime insecurity (e.g. piracy), or organized criminal activity like kidnapping may stunt supply and therefore raise prices.



Changes in weather: Temperature changes affect demand for gas for heating; flooding can slow down LNG production or export.

Stable energy prices

4

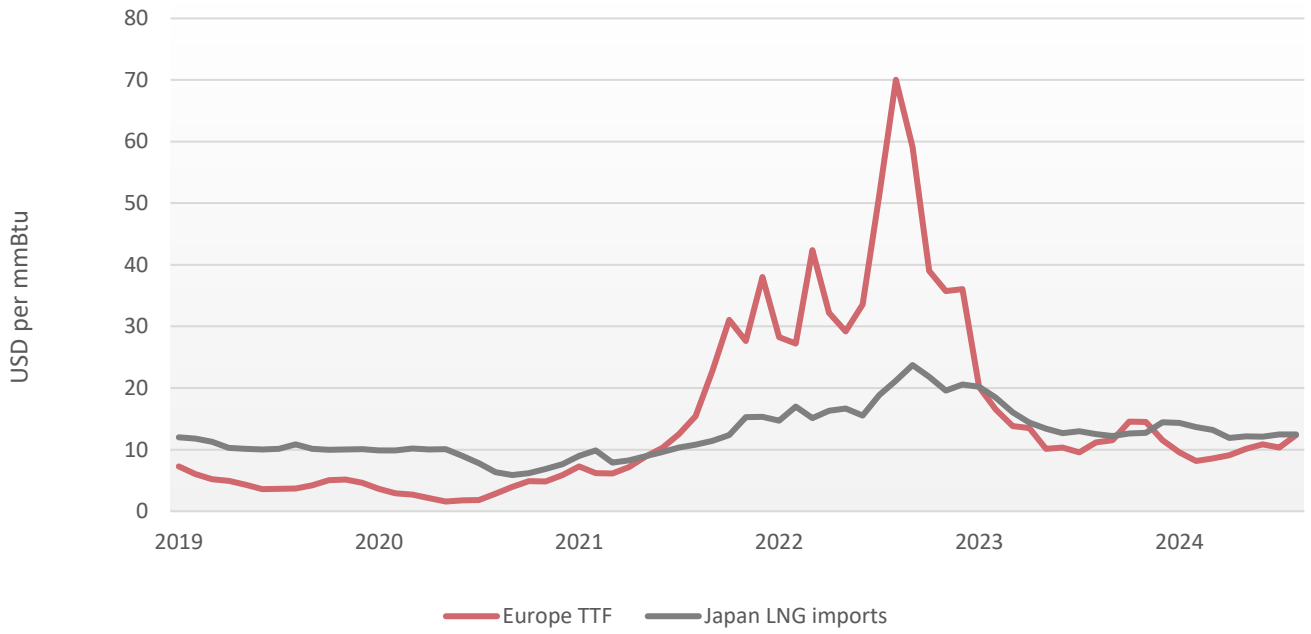
How problems in one gas market can ripple out to others: Europe following the 2022 Ukraine invasion.

When piped gas supplies from Russia fell, European authorities quickly pivoted to LNG, avoiding major domestic energy shortages in their countries. However, this resulted in much higher, more volatile prices.

NOTE: Russia's illegal invasion of Ukraine was not the only cause. In August 2023, European spot LNG prices rose 40 percent in one day over fears that workers at Australian LNG plants would strike. Europe's decisions affected faraway countries, however. Arguably the worst impacts of the Russian gas shortage were felt in Asia. For more on this, see slides XX-XX, below.

Source:
World Bank

Gas prices in Europe and Japan, USD per mmBtu



Energy sovereignty

5

Because piped gas and LNG are sold across borders, both can be weaponized for different geopolitical goals. LNG can be more vulnerable to this because of its greater links to world markets. Buying piped gas from a neighbor can be difficult if there are ongoing tensions or bad diplomatic/political history.



Colombia-Venezuela

The Colombian government may increase expensive LNG imports even though the Trans-Caribbean Pipeline from Venezuela could possibly supply cheaper gas. Colombia-Venezuela relations have been tense, and the pipeline has a history of security and supply problems.

Potential gas importers should consider the tradeoffs of “term” versus “spot” deals.

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Countries can buy gas in three ways:

- Under contracts that guarantee supplies for months or years (called “term” sales)
- One batch at a time (called “spot” sales)
- A mix of spot and term sales.

Each method has many variants. But spot and term imports carry differing degrees and types of risk that the government of an importing country should weigh upfront.

Potential gas importers should consider the tradeoffs of “term” versus “spot” deals.

Term versus spot gas imports: Risk comparison

Scenario	Term	Spot	Energy security goals not served
Prices for imported gas suddenly increase.	Lower risk, because term prices are usually fixed or at least less linked to events outside the buyer country.	High risk, because spot prices change constantly in response to many factors outside the importing country’s control.	**Goal 3. Lower energy sector costs** **Goal 4. Stable energy prices**
World gas prices fall, but an importing country cannot take advantage, and must keep paying more for imports.	Medium-high risk, depending on whether term contract prices are linked to larger price benchmarks or can be renegotiated.	Possibly lower risk than for term sales if the country can negotiate advantageous spot deals.	**Goal 3. Lower energy sector costs**
An importing country must pay for gas it doesn’t need in times of lower demand.	Medium-high risk, depending on contract terms and other reasons. Term buyers of gas usually commit to buying a specific amount over the life of the contract. Ability to reschedule deliveries of gas exists but has limits.	Lower risk, b/c the country can buy small volumes of gas at a time rather than being locked into an agreed amount.	**Goal 3. Lower energy sector costs**
Country cannot get enough gas because of gas supply/shortage issues elsewhere.	Possibly lower risk, if the country’s term suppliers are not the source of the shortfall and they honor their obligations.	Higher risk, if other LNG users buy up available spot deals first. Lower risk, if the country can successfully use spot deals to cover the shortfall.	**Goal 1. Sufficient energy supply** **Goal 2. Uninterrupted energy supply** **Goal 3. Lower energy sector costs** **Goal 4. Stable energy prices**

A cautionary tale of dependence on imported gas: Bangladesh, Pakistan and the Philippines after the 2022 Ukraine invasion.

- All three countries had become dependent on gas by building extensive domestic gas infrastructure (e.g., power plants, industrial facilities that used gas, gas-fired vehicles).
- All were importing more LNG as their own gas production declined.
- Then, Russia further invaded Ukraine and Russian gas supplies to the EU dropped.
- In the first year after Russia's illegal full-scale invasion of Ukraine, Asian LNG prices rose 300 percent. They also became increasingly volatile and unpredictable.
- A major cause was Europe buying more spot shipments of LNG, which went from 20 to 50 percent of total European gas purchases in a year.
- Russia's illegal invasion of Ukraine wasn't the only cause. Prices were already high and unstable before Russia attacked in February 2022.
  - In October 2021 Asian spot LNG prices jumped 40 percent in a single day over supply concerns in various countries.

→ The slides that follow use these three countries as examples of how relying on imported gas can upend economies and people's daily lives.

When imported gas prices rise, governments can quickly feel pressure to offer expensive, unsustainable subsidies.

The rising, unpredictable prices left Asian gas importers with a hard choice: Should they increase subsidies for domestic gas and electricity prices?

Government subsidies could take different forms. Some common examples:

- Selling imported gas to users at below-cost prices
- Reducing or canceling electricity bills; delaying bill collection
- Pausing, lowering or ending taxes related to domestic energy production and consumption
- Transferring public funds to state-owned or private companies losing money because of high gas prices (e.g., utilities)
- Borrowing money to cover the higher costs of gas imports
- Stockpiling gas (e.g., in floating offshore storage) to drive down prices

Both options—to subsidize or not subsidize—can become painful for a gas importing country's governments, industries and people almost immediately.
The negative impacts can radiate far beyond the energy sector.

Subsidizing gas imports when prices are high can cause a shortage of foreign currency and public funds, with consequent harms to a country's economy.

Lower- and middle-income countries often buy imported fossil fuels in foreign currency (especially U.S. dollars) but sell them to domestic users in the local currency. If the dollar-denominated cost of the fuel grows too big, at least two things can happen:



The country depletes its foreign currency reserves.

Bangladesh: Costlier LNG imports and lower export revenues depleted foreign exchange reserves by nearly a quarter in a year.



Private and/or public banks in the country will not have enough foreign currency for individuals, businesses and the government.

These foreign currency challenges are often compounded by impacts on the government's budget.

Subsidizing gas imports when prices are high can cause a shortage of foreign currency and public funds, with consequent harms to a country's economy.

Here are some results and ultimate costs that can follow:

Result A: The country cannot pay for essential imports.

Pakistan: Largely due to higher fuel import costs, Pakistan's foreign exchange reserves only covered six weeks of imports (fossil fuel and non-fossil fuel) by June 2022.

→ Ultimate cost: There is a shortage of electricity and other gas-dependent goods and services.

→ Ultimate cost: People go without essentials like imported food and medicine.

→ Ultimate cost: People cannot pay for services sourced from abroad.



Photo by Muhammad Muzamil for Unsplash

Subsidizing gas imports when prices are high can cause a shortage of foreign currency and public funds, with consequent harms to a country's economy.

Result B: The local currency loses value/is devalued/becomes unstable.

→ Ultimate cost: Households, businesses and public facilities experience inflation.

→ Ultimate cost: Foreign direct investment slows.

→ Ultimate cost: Companies and people with debt in foreign currency default on loans.



Photo by Swastik Arora for Unsplash

Subsidizing gas imports when prices are high can cause a shortage of foreign currency and public funds, with consequent harms to a country's economy.

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Result C: The government takes on unsustainable debt.

This can happen when the government is forced to borrow money to cover fuel import bills, absorb subsidy costs, ease foreign currency shortages, boost foreign exchange reserves, or fund other priorities that it can no longer afford because of rising gas import costs.

- Bangladesh. The national oil company ran up $300million in debts to foreign LNG suppliers by mid-2022, when Bangladeshi banks couldn't provide enough dollars. By the end of the year, the government sought a $4.7 billion loan from the IMF to help pay for food and fuel imports and replenish dollar reserves.

Many lower-income countries are already experiencing debt distress, including half of all low-income countries in sub-Saharan Africa.

Oil and gas producers may be especially vulnerable if their export revenues from extraction are already declining (because of sinking production or reduced demand), or if they already over-borrowed in expectation of a larger pay-off from oil and gas.

Once subsidies become financially unsustainable for a government, cutting them can be politically damaging and create additional economic pain. This is true even when the cuts happen more slowly, in non-emergency situations.

- Egypt. The government started phasing out gas and related subsidies in 2014, after they made up almost a quarter of public spending. Prices for gas sold to power plants nearly tripled in the first year, with a similar rise in electricity prices for most households and businesses.

Note: A dramatically higher fuel import bill can cause many of the effects above, regardless of what subsidies the government offers.

Not subsidizing expensive imported gas can lead to energy shortages and higher prices for everyday goods and services.

Bangladesh. The government raised domestic gas and electricity prices after subsidies became too expensive. Gas prices for power plants and industry rose almost 300 percent in a single day in January 2023.

Two common results in this scenario:

Result A: Power plants shut down or run less, causing an electricity shortage. Power producers in lower- and middle-income countries are already highly sensitive to fuel price changes.

- Some common reasons:
  - Selling power under fixed price contracts with thin profit margins.
  - Electricity prices are too low to recoup costs.
  - High operating losses.

If fuel prices become too high, power producers might also cancel or renegotiate their contracts to supply electricity.

- Philippines: Power producers terminated their power supply agreements with the state-owned utility in 2023, citing high LNG prices.

For more on the possible costs of an electricity shortage, see slides 18-20, below.

Result B: The costs of electricity (and other commodities made with gas or electricity) rise. This can affect parts of the economy well beyond energy.

Bangladesh. Higher electricity prices almost doubled some textile production costs. Factories responded by cutting hours, which drove down output and profits.

Gas, either as an ingredient or a source of heat, can make a wide range of goods, e.g.: fertilizer, plastics, glass, cement, iron and steel, rubber, and fuels for transportation and household cooking and heating.

Stakeholders should anticipate how a foreign gas shortage could affect gas supply in their country. The negative impacts on the economy and people can be severe.

Which foreign shortages will affect supply depends partly on the type of gas a country is importing.

- For piped gas, a shortage in the country producing the gas, or in another country that the producer country supplies, can interfere with gas deliveries to the importing country.
- For LNG, gas shortages anywhere in the world could affect an importing country's ability to secure sufficient supplies of LNG.

In a regional or global shortage, wealthier countries may get served first. They can use cash and diplomatic muscle to mop up available supplies.

- Asian gas importers after the Ukraine invasion. Many countries experienced LNG shortages partly because traders defaulted on term LNG shipments, even though this cost some traders 30 percent penalties. The traders defaulted partly because they were getting higher prices from European importers.

In extreme cases, importing countries can decide to pause gas imports during a shortage, especially if it becomes too expensive.

- Bangladesh. In the first months of the Ukraine conflict, the government kept LNG imports flowing through expensive spot deals with Japan, Oman and Qatar. But then it suspended them in the summer when costs became too high. Authorities were forced to ration gas supplied to power plants and industry.

Stakeholders should anticipate how a foreign gas shortage could affect gas supply in their country. The negative impacts on the economy and people can be severe.

Here are some consequences and costs that a gas-importing country may have to weather when gas supplies run short somewhere else:

Power plants running on gas may have to close or operate less if they cannot find enough gas, or substitute another fuel for gas.

Pakistan



In the first months after Russia attacked Ukraine, 14 power plants generating a quarter of the nation's electricity shut down.

Utilities may have to start rationing electricity through planned outages.

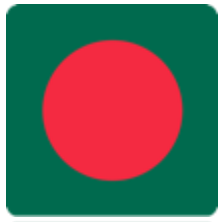
Philippines



2023 power cuts were projected to leave over a million households without power for hours a day.

Less power production can also cause the grid to malfunction, interrupting service.

Bangladesh



The gas shortage led to near-nationwide unplanned blackouts and load shedding.

Stakeholders should anticipate how a foreign gas shortage could affect gas supply in their country. The negative impacts on the economy and people can be severe.

Result A: Businesses lose productivity and profits

→ **Ultimate cost:** People lose jobs.

Pakistan: Nighttime power cuts forced retail stores across the nation to shorten their hours. Cuts were projected to cost 3-4 million jobs in 2023.

→ **Ultimate cost:** The country's export earnings and foreign exchange drop.

Pakistan: When textile mills in just one province closed for 15 days because of power cuts, it cost the country $250 million in lost export earnings. Textiles had constituted 60 percent of Pakistan's export earnings.

Bangladesh: Electricity shortages cut production of ready-made goods nearly in half in 2022. The ready-made goods sector had accounted for over 80 percent of all export revenues in the country.



Photo by Amit Rana for Unsplash

Stakeholders should anticipate how a foreign gas shortage could affect gas supply in their country. The negative impacts on the economy and people can be severe.

Result B: Public facilities and institutions cannot provide basic services.

→ **Ultimate cost:** People's health and educational performance worsens.

For examples of how electricity shortages can impact health and education, see NRGI's "The Socioeconomic Benefits of Electricity Access."



Photo by Jaikishan Patel for Unsplash

Stakeholders should anticipate how a foreign gas shortage could affect gas supply in their country. The negative impacts on the economy and people can be severe.

Result C: People and businesses rely more on dirtier, costlier fuels.

- Pakistan: Existing power plants returned to burning coal and fuel oil when gas supplies ran short.
- Pakistan and Bangladesh: Both countries commissioned new coal-burning power plants as an alternative to gas.
- Pakistan: The government announced plans to extract more coal for electricity generation because LNG was too expensive.
- Bangladesh: Factory owners ramped up use of diesel generators that were 3-4 times more expensive to run than grid power.

→ **Ultimate cost:** People experience more sickness and disease.

→ **Ultimate cost:** Households and businesses pay more for electricity.



Photo by Naeem Ad for Unsplash

Considering alternatives: How do renewables compare as a secure energy source?



Photo by DFID / Abbie Trayler-Smith for Flickr

Renewable energy sources like solar and wind are not a panacea for the many difficulties countries face in pursuing energy security through expanded gas use.

Solar and wind face some of the same challenges to gas, as well as some additional ones. For the time being, they are also only able to replace gas in generating electricity, not for other uses such as generating heat for industry.

However, giving a renewables a greater role will help many countries achieve their energy goals. The advantages of renewables will increase with time, making it even more critical for governments to "right-size" the role of gas now.

Goal 1. Sufficient energy supply



Solar and wind installations don't need companies to invest domestically in making fuel for them or rely on foreign projects to supply fuel to them. The fuel is free and available onsite.

Solar and (onshore) wind projects can also increase a government's ability to secure sufficient energy supply by providing more options in the face of demand uncertainty. Solar and wind projects are often:

- Smaller than large upstream gas projects and gas-fired power plants
- Quicker to build, often taking less than two years compared to an average nine years for upstream gas projects and four years for gas-fired power plants
- For domestic use only (unless the country also produces electricity or green hydrogen for export), which means the timing of their development is more under the government's control than upstream gas projects that often have an export component.

As a result, government officials can take a more modular/piecemeal approach to developing renewables, as electricity demand becomes more certain.

- If demand is high, the country can develop more of these projects, choosing from a menu of alternatives to fit the emerging demand profile.
- If demand turns out to be low, the government can decide not to proceed with or delay greenlighting new projects.

The government need only forecast a few years—not decades—in advance. It can therefore secure large amounts of supply without as large a risk of a costly surplus as when securing gas supply.

Goal 1. Sufficient energy supply

The main question: Can the country attract investors to build and run the new infrastructure?

Globally, investment in clean energy overtook the capital going to fossil fuels half a decade ago. It's also growing at higher rates.

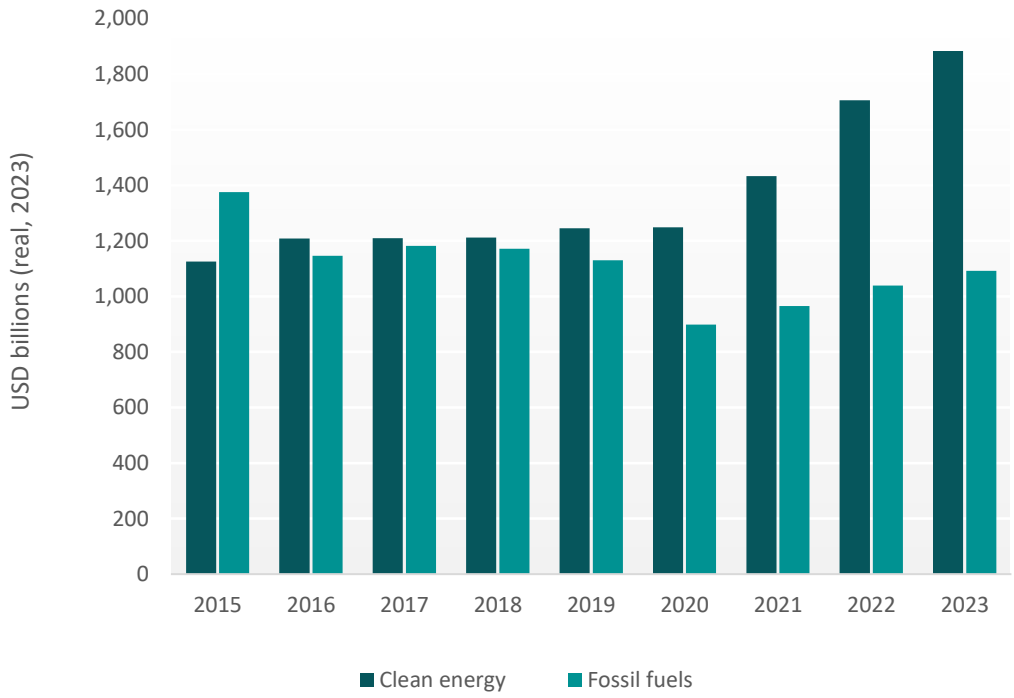
But access to capital for renewables is far from equitable. Wealthier countries attract most of the capital. They also secure better terms.

Countries will likely still have to compete for foreign investment capital, especially lower-income countries that cannot finance their own transitions to renewables. If other places look more attractive/less risky to investors, capital will flow to them instead.

Most of the challenges with attracting investment in domestic gas projects can also be problems for solar and wind. Another common concern for renewables investors is local currency value loss, which is less of a concern for gas investors if they are exporting most of their production.

But development finance institutions are now much more likely to support countries to address these challenges for renewables projects than for gas projects. They should be doing more, in particular by making high risk, low return investments.

For more on the challenges and opportunities of financing gas and renewables infrastructure, see NRGI's gas-to-power, module 4 (forthcoming 2024).



Goal 2. Uninterrupted energy supply



Solar and wind generation will not be affected by changes in global energy demand and dynamics in foreign markets (unless, possibly, if the country also produces electricity or green hydrogen for export).

Also, unlike gas reservoirs, sun and wind are not exhaustible, fast-depleting resources.

But power generation is intermittent and variable because solar irradiation and wind speeds fluctuate, both over the course of a day and longer periods.

This can be a serious challenge. Different countries will need different approaches to manage it–including back-up gas power in some cases.

Goal 3. Sufficient energy supply



Fuel costs for solar and wind installations are zero. Sunshine and wind are free and available onsite.

Fuel cost is the biggest variable for what it costs to run a gas power plant. For solar and wind, it is the up-front cost of building the infrastructure.

In some lower- and middle-income countries, which face a high cost of capital, high up-front costs for solar and wind mean that gas power is still cheaper, at least for now.

A common measure of the cost of power generation is the levelized cost of electricity (LCOE), (though it has limitations). An LCOE includes upfront capital expenses (capex), operation and maintenance costs (opex), and fuel costs.

Worldwide, average LCOEs for solar photovoltaic, onshore wind and offshore wind power fell dramatically over the last decade (by 90, 67 and 60 percent respectively). Gas power LCOEs saw no similar change.

But renewable LCOEs remain higher in some places—especially lower-income countries.

- IEA analysis for Africa: Average LCOEs for combined cycle gas turbines are still lower than for solar PV—though this could change by 2030.

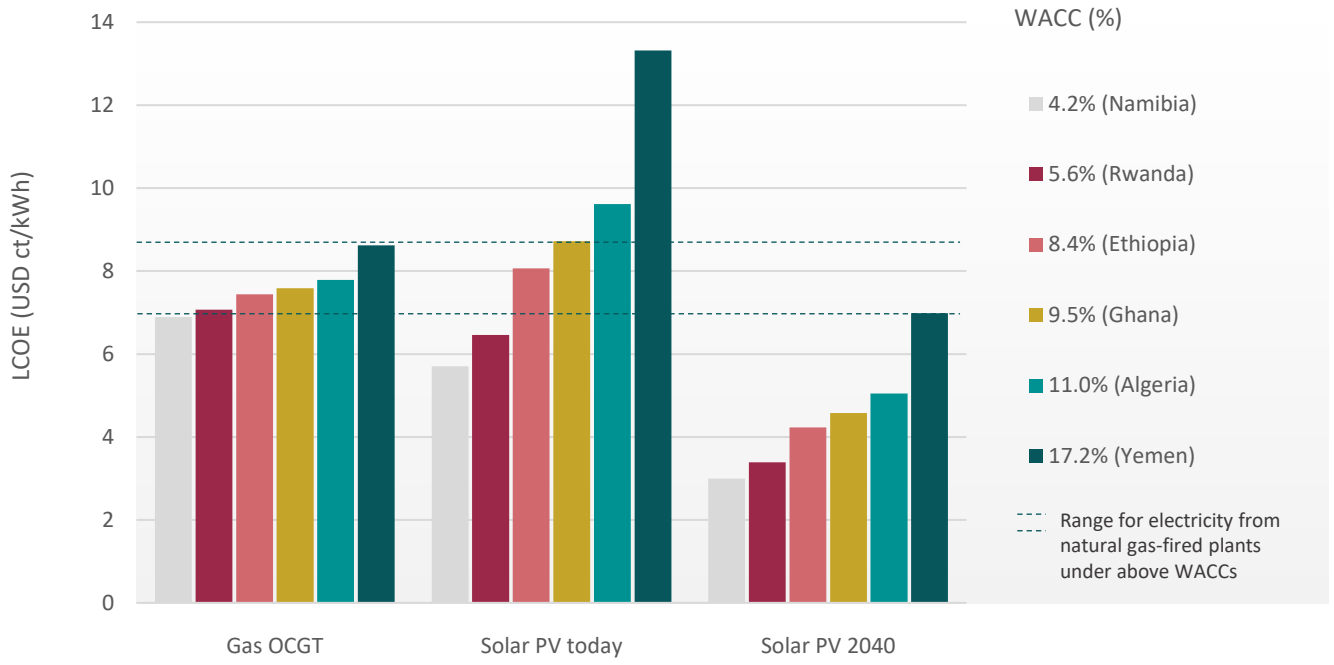
Goal 3. Sufficient energy supply

LCOEs for solar and wind are expected to keep falling, while there are no similar predictions for gas.

The variability of solar and wind has implications for the approach to, and cost of, grid infrastructure and management. But because many lower- and middle-income countries would also need to build out their infrastructure for a significant expansion of gas capacity, the difference in system costs is likely smaller.

More country-specific data and analysis are needed to predict the future costs of gas and renewable power in particular places. For example, there is limited country-specific analysis for African countries.

Governments, investors and development partners need to do more to bring down upfront costs for renewables in lower- and middle-income countries, especially the high cost of capital.



Goal 4. Stable energy prices



Solar and wind generation are much less affected by price dynamics in foreign markets (except when the country also produces electricity or green hydrogen for export, or supply chain issues make imported components more expensive). The sun and wind won't run out, so once installations are built, there won't be a need to abruptly switch supply source, which often has price implications.

Goal 5. Energy sovereignty



Solar and wind generation will not be affected by dynamics in foreign markets (unless, possibly, if the country is also producing electricity or green hydrogen for export).