

*We create change in flow*

***energy monitor***



*The International Energy Agency's World Energy Outlook finds that North America is at the forefront of transformation in oil and gas production that will have a worldwide effect.*



*Daniel Bernoulli*

**Q4 2012**



Flow Research, Inc.

## **Oil & Gas and Refining Power & Renewables**

### **Focus:**

- **New-technology flowmeters still going strong**
- **IEA's World Energy Outlook**
- **The future of Venezuelan oil policy**
- **Indonesia focuses on domestic energy needs**
- **Asia-Pacific could transform its gas market**

**A *Worldflow* publication**



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# **Energy Monitor**

## **Q4 2012**

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# Energy Monitor Q4 2012

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*Boulder Canyon, Boulder, Colorado*

*Photo by Flow Research*

The **Energy Monitor** is part of the Worldflow Monitoring Service. Other publications include the **Market Barometer** and **Flash Reports**. **Worldflow Online** provides more in-depth information and analysis about the instrumentation business. Here is our **Worldflow** schedule:

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**Energy Monitor**—May 2013

### *Q2 2013*

**Market Barometer**—June 2013

**Energy Monitor**—July 2013

### *Q3 2013*

**Market Barometer**—August 2013

**Energy Monitor**—September 2013

### *Q4 2013*

**Market Barometer**—October 2013

**Energy Monitor**—November 2013



## Issues and Perspectives: New-tech flowmeters

### After 10+ years of studies, Flow Research still sees new-technology flowmeters growing in market share

By Jesse Yoder, PhD, Flow Research

My market research career began in 1991 after ten years as a technical writer for an insurance company, a computer manufacturer, and for Siemens, a manufacturer of programmable logic controllers (PLCs). My time with Siemens ended when they moved their Danvers, Massachusetts division down to Alpharetta, Georgia. My main task at Siemens was writing training guides and course manuals for the PLC courses.

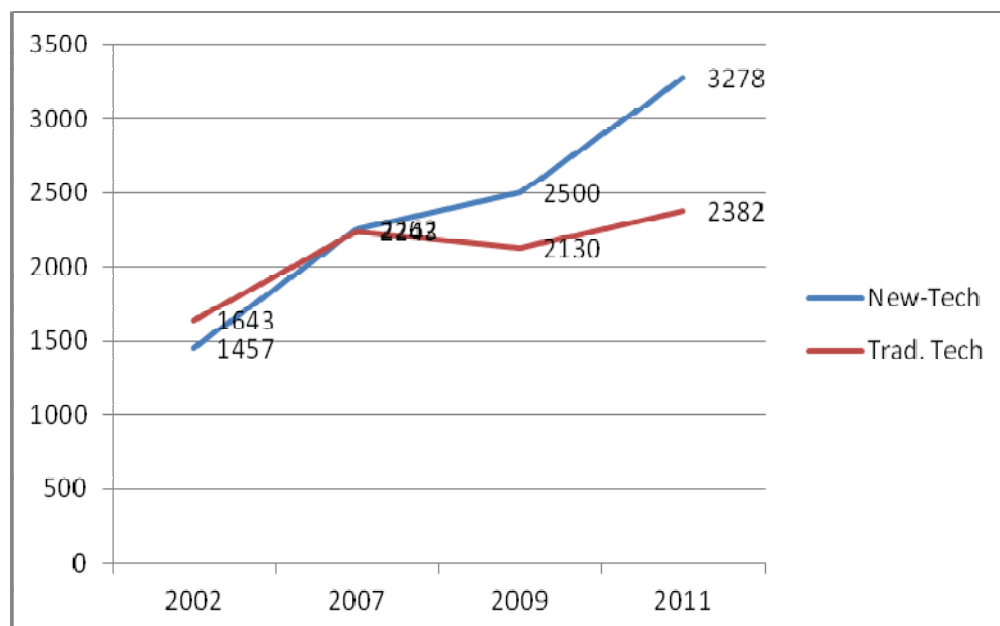
I became bored with technical writing because it did not require original research and because its structure was so tightly formatted. After leaving Siemens, I took a number of market research jobs writing about multiple topics, such as barcode equipment, test and



Jesse in Sydney, Australia

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#### Worldwide revenues for new-technology and traditional technology flowmeters in millions of dollars from 2002 through 2011



## Issues and Perspectives: New-tech flowmeters

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measurement equipment, process control equipment in Europe, and nondestructive test equipment. What I found was that, while market research was far more interesting and challenging than technical writing, it did not pay as well. Even so, I stayed the course, and continued writing market studies about multiple subjects.

After several years of this, I realized that my reports would be much better if I better understood the technology I was writing about. In 1993, I landed a contract with Find/SVP in New York to write a worldwide study of the flowmeter market. I decided then to make flow and instrumentation my main area of expertise. I viewed flowmeters as mechanical and electronic sensors, which fit in well with my philosophical view of mind as a biological sensor. This connection between philosophy and flow gave me a powerful motivation to study flow, and made flowmeters and instrumentation much more fascinating.

I have been writing more or less continuously about flow and instrumentation since 1993. I

*(Continued on page 11)*

### 7 reasons why new-technology meters continue to dominate

Why do new-technology flowmeters continue to gain share of the worldwide flowmeter market? There are many reasons, but here are some of the strongest:

1. New-technology flowmeters are typically more reliable over time than most traditional technology meters. They are minimally intrusive, do not have moving parts, and manufacturers have put a lot of effort into improving their reliability.
2. New-technology flowmeters are typically more accurate than traditional meters. Coriolis and multipath ultrasonic flowmeters are the most accurate meters made. As the prices of fluids measured rise, particularly petroleum liquids, accuracy becomes more important.
3. More research and development work is being done on new-technology meters than traditional meters. Coriolis and ultrasonic suppliers have brought out a steady stream of new features and products over the past five years, while less development is being done on primary elements, positive displacement meters, and variable area meters.
4. New-technology meters are more the subject of conferences where technical papers are read and discussed than traditional meters. Colorado Engineering and Experiment Station, Inc. (CEESI) conducts one or more ultrasonic flowmeter workshops every year. Coriolis, ultrasonic, and multiphase meters are discussed at the North Sea Flow Workshop in Norway and Scotland. Multiphase meters are an emerging technology. The Flow Measurement Forum held in Perth, Australia in November 2012 focused on flowmeters used in the energy industry, especially Coriolis and ultrasonic. Positive displacement, differential pressure (DP), and variable area meters are simply not getting the same mindshare as Coriolis and ultrasonic meters.
5. Much of the growth in the flowmeter market is driven by growth in the energy industries, especially oil and gas. Here DP

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## Issues and Perspectives: New-tech flowmeters

(Continued from page 10)

have made a sustained attempt to understand the technology, including attending courses, interviewing experts in the field, and writing multiple articles. I find that I come to understand something more readily when I write about it. My philosophical background has proved to be my best training for writing.

In 1998, I founded Flow Research in Wakefield, Massachusetts. My goal then and now was to have a market research company exclusively devoted to flow, temperature, pressure, and other related instrumentation topics. After doing several temperature studies, we began systematically researching every flow technology and publishing the results. Our philosophy was to proceed from the bottom up. We researched each flow technology first, and then put the results of this research into our first “*Volume X*”, a study of all flowmeter technologies worldwide in a single volume. This first study was published in April 2002.

In studying the flowmeter markets, we found that most flowmeters fell into one of two groups: those that had been around and studied for 50+ years, and those that had been introduced in the second half of the 20<sup>th</sup> century. The former we classified as “traditional technology” flowmeters, while we called the latter “new-technology” flowmeters. We later added “emerging technology” flowmeters that have been developed in the past 20 years.

What is generally true of many traditional meters is that they are mechanical, intrusive, and in

(Continued on page 12)

## 7 reasons why new-technology meters continue to dominate

(Continued from page 10)

- and turbine meters an advantage in gaining early approvals for custody transfer applications. But since 1995, multipath ultrasonic meters have been gaining custody transfer approvals for both liquid and gas applications. And in the past ten years, Coriolis meters have also gained these approvals. This has enabled ultrasonic and Coriolis suppliers to compete effectively with DP and turbine suppliers for the highly valued custody transfer market.
6. Multipath ultrasonic flowmeter suppliers have invested millions of dollars in research and development to develop products that will meet both AGA and API standards. Many of these flowmeters are relatively high in price compared to other meters. For example, the average selling price of multipath ultrasonic flowmeters for custody transfer purposes is around \$35,000. Some multipath meters for petroleum liquid applications are significantly more expensive. There is high demand for these meters, which drives up the total revenues for ultrasonic meters.
  7. Four Coriolis suppliers have developed Coriolis flowmeters for line sizes from 8 to 16 inches. These meters are mainly aimed at the market for custody transfer applications in oil and gas. Many of them sell in the range of \$75,000. Coriolis meters are very popular with end-users, mainly due to their high accuracy and reliability, so these large size meters are beginning to make a significant impact on the market. At the same time, they help drive up the total revenues for Coriolis flowmeters.

## Issues and Perspectives: New-tech flowmeters

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many cases have moving parts. Their accuracy level is generally less than that of new-technology meters. Traditional technology meters include differential pressure, positive displacement, turbine, open channel, and variable area.

New-technology flowmeters are minimally intrusive, are generally electronic, typically have higher accuracy and reliability than traditional meters, and typically do not have moving parts. They were introduced since 1950. New-technology flowmeters include Coriolis, magnetic, ultrasonic, vortex, and thermal. Thermal flowmeters were originally classified as traditional meters but were reclassified in 2003 as new-technology flowmeters after extensive discussions with thermal flowmeter suppliers.

Flow Research has continued to study individual flow technologies since 2000, and has published three more editions of *Volume X: The World Market for Flowmeters*. It is very instructive to compare the results of these four different studies. The results show how new-technology flowmeters have been gaining in market share over traditional meters over the past 10 years (see chart below). This chart shows the percentage of total worldwide revenues made up by new-technology vs. traditional technology flowmeters in the four years for which the studies were done. During this 10-year period, new-technology flowmeters have gained about 10 percentage points, while traditional meters have lost about ten percentage points. None of these figures include residential meters. This first study was published in April 2002.

### Will these same trends continue?

Expect the trend toward new-technology flowmeters that has been established over the past ten years to continue. However, the picture is likely to become more complex as emerging technologies begin to make their presence felt. Multiphase flowmeters are having a major impact in the oil and gas market. Other emerging technologies such as optical and sonar are effective, but have yet to gain wide adoption. Of course, it is also possible that someone will come up with a completely novel way to measure flow, and reshape the existing flowmeter market.

### Comparison of new-technology & traditional technology revenues for all flowmeters worldwide from 2002 to 2011

	2002	2002	2007	2007	2009	2009	2011	2011
Flow-meter type	\$ Mil-lions	% of total	\$ Mil-lions	% of total	\$ Mil-lions	% of total	\$ Mil-lions	% of total
New-Tech	1,457	47.0%	2,262	50.2%	2,500	54.0%	3,278	57.9%
Trad. Tech	1,643	53.0%	2,243	49.8%	2,130	46.0%	2,382	42.1%
<b>Total</b>	<b>3,100</b>	<b>100.0%</b>	<b>4,505</b>	<b>100.0%</b>	<b>4,630</b>	<b>100.0%</b>	<b>5,660</b>	<b>100.0%</b>

## Issues and Perspectives: World Energy Outlook

### IEA: North America leads a dramatic shift in global energy production, yet efficiency is just as important as supply

November 12, 2012 – The global energy map is changing in dramatic fashion, the International Energy Agency said as it launched the 2012 edition of the *World Energy Outlook (WEO)*. The agency's flagship publication, released today in London, said these changes will recast expectations about the role of different countries, regions and fuels in the global energy system over the coming decades.

“North America is at the forefront of a sweeping transformation in oil and gas production that will affect all regions of the world, yet the potential also exists for a similarly transformative shift in global energy efficiency,” said IEA Executive Director Maria van der Hoeven. “This year’s *World Energy Outlook* shows that by 2035, we can achieve energy savings equivalent to nearly a fifth of global demand in 2010. In other words, energy efficiency is just

as important as unconstrained energy supply, and increased action on efficiency can serve as a unifying energy policy that brings multiple benefits.”

The *WEO* finds that the extraordinary growth in oil and natural gas output in the United States will mean a sea-change in global energy flows. In the New Policies Scenario, the *WEO*'s central scenario, the United States becomes a net exporter of natural gas by 2020 and is almost self-sufficient in energy, in net terms, by 2035. North America emerges as a net oil exporter, accelerating the switch in direction of international oil trade, with almost 90% of Middle Eastern oil exports being drawn to Asia by 2035. **Links between regional gas markets will strengthen as liquefied natural gas trade becomes more flexible**

*(Continued on page 14)*



*In this June 25, 2012 file photo, a crew works on a drilling rig at a well site for shale-based natural gas in Zelienople, Pa. Canada is looking to Asia to export British Columbia natural gas. The World Energy Outlook found North America at the head of “a sweeping transformation in oil and gas production that will affect all regions of the world.” (Keith Sracocic, AP)*

# Issues and Perspectives: World Energy Outlook

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**and contract terms evolve.** While regional dynamics change, global energy demand will push ever higher, growing by more than one-third to 2035. China, India and the Middle East account for 60% of the growth; demand barely rises in the OECD, but there is a pronounced shift towards gas and renewables.

**Fossil fuels will remain dominant** in the global energy mix, supported by subsidies that, in 2011, jumped by almost 30% to \$523 billion, due mainly to increases in the Middle East and North Africa. Global oil demand grows by 7 mb/d to 2020 and exceeds 99 mb/d in 2035, by which time oil prices reach \$125/barrel in real terms (over \$215/barrel in nominal terms). A surge in unconventional and deepwater oil boosts non-OPEC supply over the current decade, but the world relies increasingly on OPEC after 2020. Iraq accounts for 45% of the growth in global oil production to 2035 and becomes the second-largest global oil exporter, overtaking Russia.

While the regional picture for natural gas varies, the global outlook over the coming decades looks to be bright, as demand increases by 50% to 5 trillion cubic metres in 2035. Nearly half of the increase in production to 2035 is from unconventional gas, with most of this coming from the United States, Australia and China. Whether demand for coal carries on rising strongly or changes course radically will depend on the strength of policy decisions around lower-emissions energy sources and changes in the price of coal relative to natural gas. In the New Policies Scenario, **global coal demand increases by 21%** and is heavily focused in China and India.

**Renewables** become the world's second-largest source of power generation by 2015 and close in on coal as the primary source by 2035. However, this rapid increase hinges

critically on continued subsidies. In 2011, these subsidies (including for biofuels) amounted to \$88 billion, but over the period to 2035 need to amount to \$4.8 trillion; over half of this has already been committed to existing projects or is needed to meet 2020 targets.

Ambitions for nuclear have been scaled back as countries have reviewed policies following the accident at Fukushima Daiichi, but capacity is still projected to rise, led by China, Korea, India and Russia.

**Water** is essential to the production of energy, and the energy sector already accounts for 15% of the world's total water use. Its needs are set to grow, making water an increasingly important criterion for assessing the viability of energy projects. In some regions, water constraints are already affecting the reliability of existing operations and they will introduce additional costs. Expanding power generation and biofuels output underpin an 85% increase in the amount consumed (the volume of water that is not returned to its source after use) through to 2035.

“Our analysis shows that in the absence of a concerted policy push, two-thirds of the economically viable potential to improve energy efficiency will remain unrealized through to 2035. Action to improve energy efficiency could delay the complete ‘lock-in’ of the allowable emissions of carbon dioxide under a 2°C trajectory – which is currently set to happen in 2017 – until 2022, buying time to secure a much-needed global climate agreement. It would also bring substantial energy security and economic benefits, including cutting fuel bills by 20% on average,” said Fatih Birol, IEA Chief Economist and the *WEO*'s lead author.

[www.iea.org](http://www.iea.org)

## Global Spotlight: The future of Venezuelan oil

### Will Venezuela continue 'oil diplomacy' and social development that critics say have debilitated the oil industry?

By Belinda Burum, Special to Flow Research

Oil companies, as well as politicians, are watching with interest to see what develops in Venezuela following the March 5 passing of Hugo Chavez, who died after 14 years in office. The direction Chavez' successor takes toward oil will affect not only Venezuela, whose economy is dependent on the oil sector, but also the entire industry, especially companies wanting to take advantage of perhaps the largest oil and natural gas reserves in the world.

Venezuela is the largest exporter of crude oil in the Western Hemisphere and home to bountiful oil and natural gas reserves in that many critics feel are underdeveloped.

Chavez controlled PDVSA, the country's state oil company, and used the country's oil revenue to fund social development programs for his "20<sup>th</sup> Century Socialism." This meant less money to put back into the oil & gas infrastructure. Critics say the infrastructure was neglected and that the oil industry in the country is now in shambles. They note that Venezuela's oil production dropped by almost a third under Chavez – from about 3.5 million barrels-a-day to less than 2.5 million.

Chavez's investment policies also left a legacy of projects with foreign companies in the Orinoco heavy oil belt that are now behind sched-

ule.

In addition to his social policies, Chavez implemented a generous 'oil diplomacy' strategy, selling millions of heavily subsidized barrels to Cuba, as well as to Argentina and Bolivia. According to Reuters, Venezuela provides close to 100,000 barrels per day of oil to Cuba in exchange for a host of services including doctors that staff free health clinics in slums and

rural areas. Chavez also nationalized the Venezuelan holdings of oil giants including ExxonMobil, ChevronTexaco, Statoil, ConocoPhillips, and BP. Despite Chavez' denunciation of "US Imperialism," however, Venezuela consistently ranks as one of the top suppliers of oil to the U.S.



*Pro-Chavez sentiment still runs high in Venezuela and is giving the edge to his chosen successor in the April 14 presidential election.*

Now, according to a March report by the International Energy Agency (IEA), Venezuela's oil industry could deteriorate further if Acting President Nicolas Maduro, Chavez' chosen successor, wins national elections April 14.

"The future of the Venezuelan oil industry, and of Venezuela itself, may well hinge on finding the right balance between the divergent needs of caring for the population and nursing a long-neglected oil sector back to health," the IEA said. "Venezuela's next leader faces a Catch 22 situation: current oil policies – namely, the diversion of oil revenues to fund costly social

*(Continued on page 16)*

## Global Spotlight: The future of Venezuelan oil

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programs – cannot continue without putting the oil industry – and the country's entire economy – at considerable risk," the report said.

### Commanding lead for Maduro

According to a survey publicized March 18, the first major poll since Chavez' death, Maduro – a 50-year-old former bus driver and union leader who rose to become Minister of Foreign Affairs under Chavez – has a 14-percentage point lead over opposition candidate Henrique Capriles and would win 49.2 percent of vote compared with 34.8 percent for Capriles. The 40-year-old Capriles, a centrist, reportedly hardworking lawyer and state governor from a wealthy family who emphasizes his working-class roots, lost to Chavez by 11 percentage points in 2012.

Even if Maduro wins as favored, however, it's uncertain how he will deal with the oil industry, according to the IEA. In fact, with Oil and Mining Minister and PDVSA Pres. Rafael Ramirez continuing to head the oil sector, the IEA expects production operations to remain unaffected in the short term.

Some experts predict that the current approach needs someone of Chavez' stature to continue it, according to a CNN interview with Miguel Tinker Salas, a professor of Latin American History at Pomona College in Claremont, California *The Enduring Legacy: Oil, Culture, and Society in Venezuela*. Salas also maintains that many Venezuelans worry about the long-term sustainability of Chavez' policies.

The IEA does predict that the oil diplomacy program – controversial within Venezuela – may be the first of Chavez' policies to go, to be dropped in favor of increased exports at market prices.

For now, the Cuba issue is shaping up to be an



*Presidential candidates Nicolás Maduro, 50, (left) and Henrique Capriles, 40 (right) are focusing on crime and subsidized oil exports as they trade barbs while campaigning for the April 14 Venezuelan election. The centrist Capriles, a lawyer and state governor, calls Madura, a former bus driver and union organizer, Cuba's puppet, inept and a mere imitation of Chavez.*

important point in the campaign. During the campaign, Capriles has stated that what he considers "give aways" to foreign countries must end. Of particular note is his insistence that Venezuela should no longer subsidize the Cuban economy via discounted oil prices.

Capriles also has taken aim at Cuba's Castro brothers directly. Referring to the discounted oil prices, Capriles said, "Not another drop of oil will go to the financing of the Castros. I'm the candidate of the Venezuelan people. This (current) model is not viable."

Ending the cheap oil sales to Cuba, Capriles claims, would free up resources to boost public employees salaries. This popular notion would also serve to counteract the nation's high inflation rate which has depressed real spending power in the country. na hospital.

International oil companies are interested in seeing a change in the Venezuelan govern-

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## Global Spotlight: The future of Venezuelan oil

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ment's direction as they seek greater access to the world's largest crude reserves.

Capriles is trying to paint Maduro as a weak imitation of Chavez and accuses Maduro of exploiting the emotion over Chavez's death, but pro-Chavez sentiment is high and some people, including Chavez's family, have taken offense at some of Capriles' remarks.

### Effects of sustained political uncertainty

As for the state oil & gas company, some analysts say sustained political uncertainty has paralyzed decision making and restrained outside investment in Venezuela's oil sector.

Russian and Indian companies planning to invest in the country's oil fields have withheld incremental new money, and China has not announced a new line of credit or extensions on its development-linked financing since last April.

According to experts cited in for a March 6 commentary in *Oil & Gas Journal*, PDVSA's internal and managerial capabilities have deteriorated since 2002.

"Increasingly, PDVSA relies on contractors, as well as other private company partners, to keep the fields in production but reports state that contractors have not been paid in months and that the political uncertainty in the country has even driven routine decision making to a halt," they said according to Sarah A. Ladislav, co-director of the Center for Strategic and International Studies' Energy and National Security Program, and CSIS Senior Vice-Pres. Frank A. Verrastro, who holds the James R. Schlesinger Chair for Energy and Geopolitics there.

However, also according to the *OGJ*, Oil and Mining Minister Ramirez said on March 1 that PDVSA plans to increase its expenditures to \$25 billion in 2013. Cooperation between PDVSA and Russia's Rosneft consortium also

### Facts about Venezuela:

- Some of the largest oil and natural gas reserves in the world.— about 300 billion barrels of proven oil reserves, compared to about 270 billion barrels in Saudi Arabia
- One of the top suppliers of oil to the U.S.
- One of the world's largest exporters of crude oil and the largest in the Western Hemisphere
- As a founding member of the Organization of the Petroleum Exporting Countries (OPEC), Venezuela is an important player in the global oil market.
- Oil represents the bulk of total energy consumption in Venezuela. Over the last decade the share of oil consumption in the country's total energy mix has risen from 36 to 47 percent, largely because the Venezuelan government subsidizes liquid fuels.
- Venezuela's conventional crude oil is heavy and sour by international standards. As a result, much of Venezuela's oil production must go to specialized domestic and international refineries. The country's most prolific production area is the Maracaibo basin, which contains slightly less than half of Venezuela's oil production. Many of Venezuela's fields are very mature, requiring heavy investment to maintain current capacity. Industry analysts estimate that PdVSA must spend some \$3 billion each year just to maintain production levels at existing fields, given decline rates of at least 25 percent.

Source: U.S. Energy Administration

has been growing, Ramirez said on Jan. 31.

But Ladislav and Verrastro conclude: "Even under the best of circumstances, reform in the energy sector will take a long time to emerge. The damage that has been done to not only PDVSA but to the institutions of the state and civil society could take years to rehabilitate."

# Global Spotlight: Indonesia

## Indonesia focuses on securing energy for its growing needs

Indonesia, the world's third-fastest growing economy, is a significant and well established player in the international oil and gas industry. In recent years, however, the populous country has failed to keep up with demand.

Indonesia has the largest population in South-east Asia and the fourth largest population in the world behind China, India, and the United States. Although Indonesia has been a net importer of oil since 2004, it is the eighth largest net exporter of natural gas, and the world's largest exporter of coal by weight. However, because of an inadequate infrastructure and complex business environment, Indonesia has struggled to attract enough investment to meet its energy development goals.

As domestic energy needs grow, Indonesia is increasingly trying to focus on securing energy sources for its domestic market. The demand for electricity, for instance, is still not being met by supply, and power shortages and areas with poor electrification infrastructure are both

### Indonesia Energy Highlights

- Eighth largest exporter of natural gas
- Natural gas production has increased by more than one-third since 2005
- Oil production has not kept up with domestic demand
- Third-largest generator of geothermal power
- World's largest exporter of coal by weight
- The world's third largest exporter of LNG
- Majority of natural gas goes to Japan as LNG and to Singapore via pipeline system

symbols of how far the country still needs to go in providing for its own needs.

Natural gas production has increased by more than one-third since 2005, but the country has fallen in world rankings from being the sixth

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# Global Spotlight: Indonesia

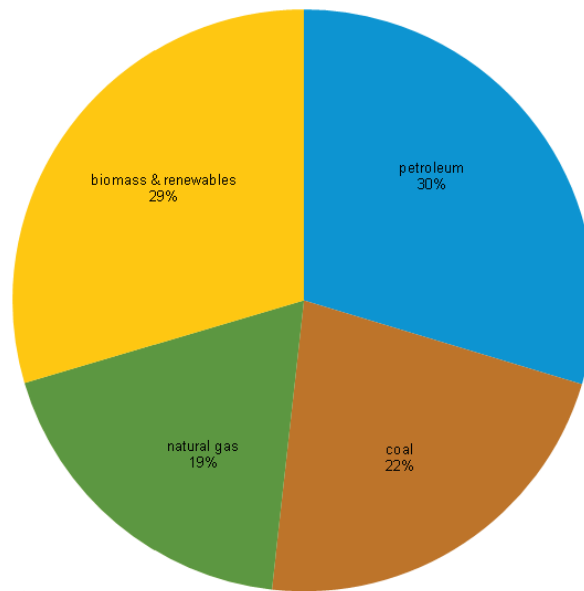
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largest natural gas producer in 2009 to being the eighth largest in 2011. And in the case of oil, Indonesia — an OPEC member country until 2009 — has not been a net exporter since 2004. Today, coal consumption is encouraged as a way of supplementing other energy sources despite its drawbacks.

Population growth, improving per capita incomes, and industrialization have all contributed to a fast rise in domestic energy demand and consumption. The inability of Indonesia’s plentiful natural resources to meet this demand more successfully is largely rooted in government policies that restricted the development of energy resources.

Indonesia has maintained vigorous economic growth for more than two decades. Even including the 2008-2009 worldwide recession, the country’s average GDP growth rate for the last five years has been just under 6 percent. The 4Q 2102 GDP was more than 6 percent. Indonesia’s export industries have benefited

Indonesia total primary energy consumption, 2011



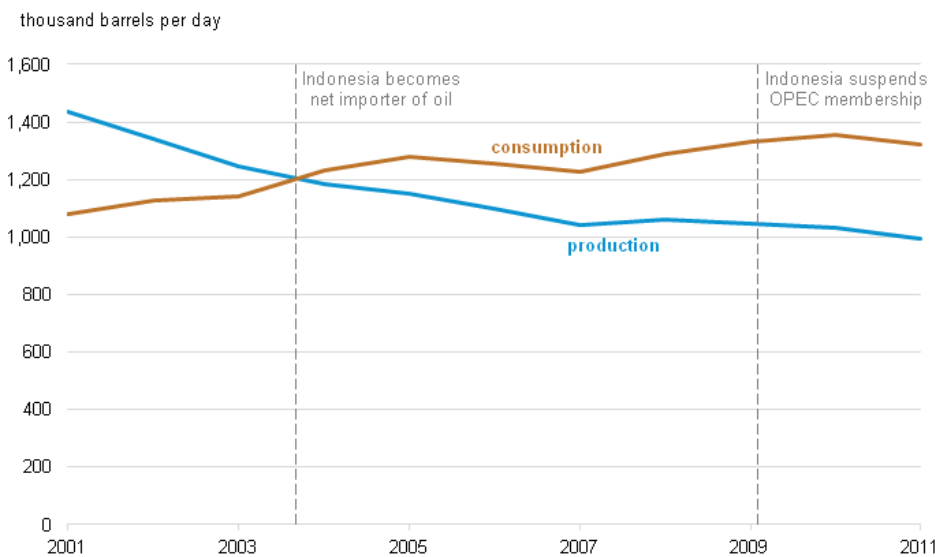
Source: U.S. Energy Information Administration, International Energy Statistics.

from their proximity to the fast-growing markets of Malaysia and China, and the government’s stability did not dissuade private investment in many sectors of the economy.

The energy industry did not perform as needed, however. The government of Indonesia controls the state-owned Pertamina com-

pany, and for some years government policy interfered with the distribution of Pertamina operating revenues being put back into the company’s operations. Pertamina’s revenues were diverted into social and other domestic programs, and foreign companies faced operating restrictions.

Oil supply and consumption, Indonesia 2001-2011



Source: U.S. Energy Information Administration, International Energy Statistics.

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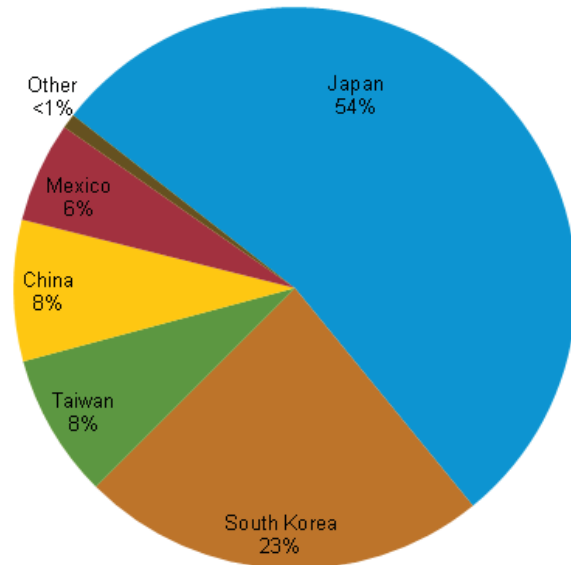
# Global Spotlight: Indonesia

(Continued from page 19)

This lack of investment capital resulted in oil fields not being continuously and fully developed and new oil and gas discoveries not being pursued. In particular, large and newly identified offshore oil and gas reservoirs were not brought into production for lack of available capital.

This energy picture began to change in 2009 as certain restrictions were loosened which in turn led to an increase in developmental partnerships with international energy companies. And, in 2011, the government further improved the financial picture as it delivered on promises of land reform while also introducing a new development strategy in its Master Plan for Economic Expansion and Acceleration 2011-2025. This document is now the blueprint for how the public/private sectors will work together in the

Indonesia LNG exports by destination, 2010



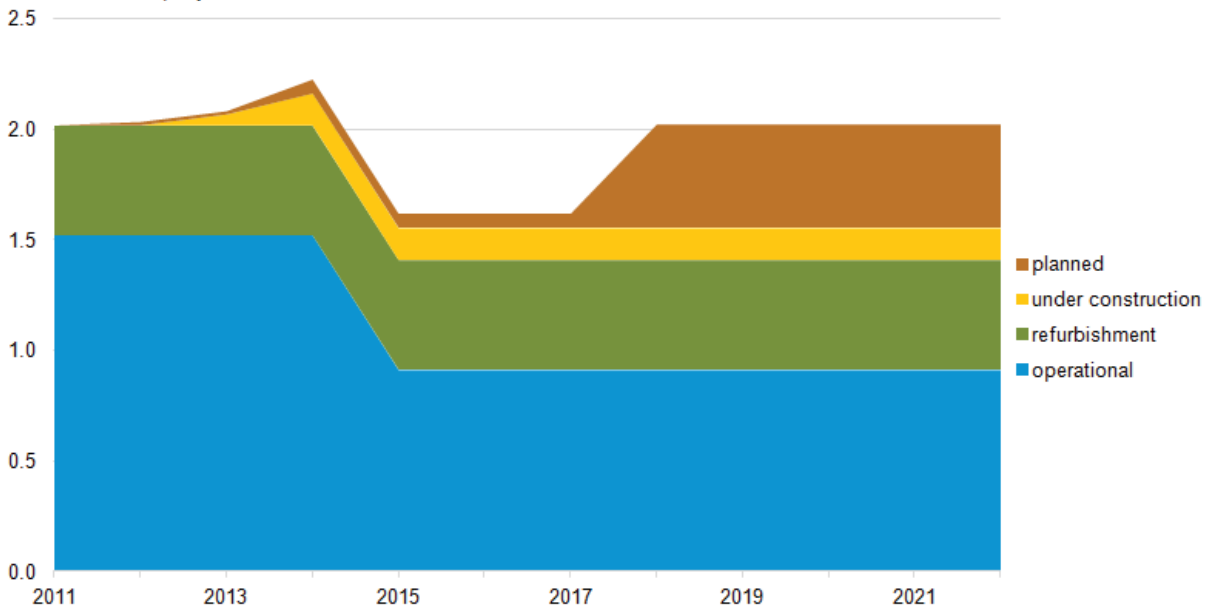
Sources: U.S. Energy Information Administration, PFC Energy

future. Thus far, results have been positive as the document has served to entice an increase in private sector investment into Indonesia's

(Continued on page 21)

Indonesia projected liquefaction capacity

trillion cubic feet per year



Source: U.S. Energy Information Administration, PFC Energy

# Global Spotlight: Indonesia

(Continued from page 20)  
energy future.

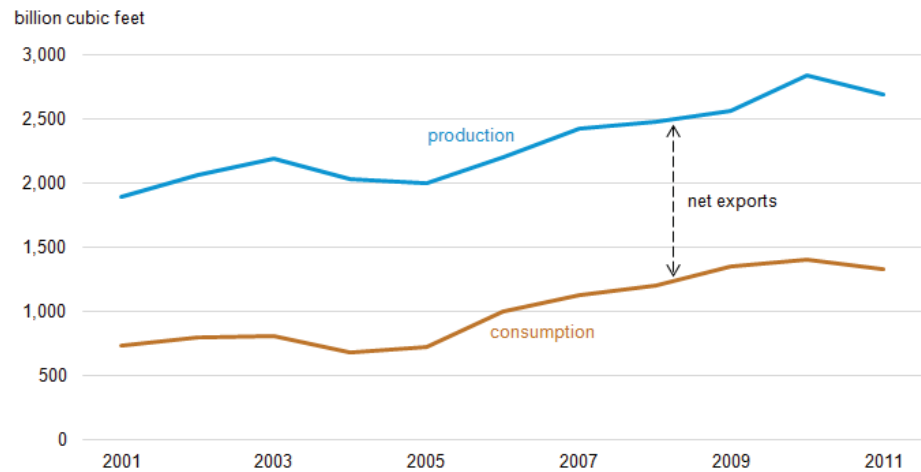
Future prospects look bright. Chevron is now the largest single oil producer in Indonesia, accounting for more than 45 percent of the country's total crude production in 2012. Underutilized topside oil fields are experiencing heightened recovery percentages as new drilling and new drilling methods are employed.

The country has an estimated 90 billion barrels of crude oil in offshore deposits, and in 2011 more than half of Indonesia's natural gas production was from offshore fields. It is estimated that more than 60 percent of all gas re-

serves are located offshore. Biomass and renewable sources account for nearly 30 percent of total consumption.

Indonesia's energy resurgence is here and should continue into the foreseeable future.

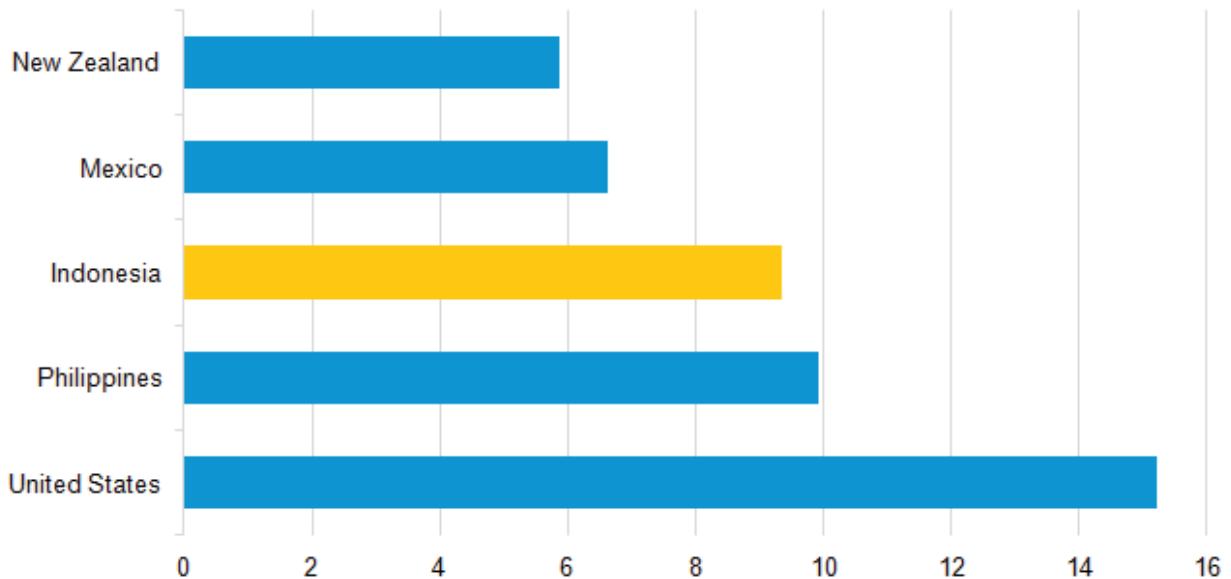
Indonesia dry natural gas production and consumption, 2001-2011



Source: U.S. Energy Information Administration, International Energy Statistics.

## Top five generators of geothermal electricity, 2010

billion kilowatthours



Source: U.S. Energy Information Administration, International Energy Statistics.

# ***Oil & Gas and Refining***

*This section covers important events in the oil, gas, and refining industries, which include companies producing petroleum, hydrocarbon liquids, and natural gas and extracting oil. It also includes petrochemical companies.*

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