The energy challenge: how will it impact global petrochemicals and the development of the industry in India?

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Today, I'm going to offer you a view from Shell about the challenge the world faces in powering the global economy in the years to 2050 and beyond. At the heart of this challenge is energy. It's the driving force behind the world's economic growth and prosperity, and two key energy resources, oil and gas, are the lifeblood of today's global petrochemical sector.

In March 2009, it looks like we face a tough road ahead, particularly in the light of the current global economic malaise. But as the saying goes: when the going gets tough, the tough get going.

For the petrochemical sector, globally and here in India, the energy challenge holds significant new business opportunities for the toughest and most creative players.

Let's explore the challenge.

The global energy challenge

Within the Shell Group, we have compressed the global energy challenge into just five words: more energy, less carbon dioxide.

There are the three hard truths about energy supply and demand that we can no longer avoid. Whatever short-term impact the current global economic slowdown may be having, the world's energy future is one of surging demand, constrained supplies and increased stresses on the environment.

Estimates suggest energy demand could double by 2050 as world population rises by 40%. Energy demand is growing rapidly as large countries such as China and India industrialise. According to International Energy Agency and OECD forecasts, China and India together - two countries that are entering the most energy intensive phase of economic development - are likely to account for 40% of global energy demand growth to 2030.

Meanwhile, against this backdrop of surging demand, it is widely accepted that after 2015 supplies of easily accessible oil and natural gas will increasingly

struggle to match demand. To close the gap, the world will need to use energy more efficiently and increase its use of other sources of energy.

This means more renewables like solar, wind and biofuels. But it also means more nuclear energy, more coal, and more oil and natural gas from difficult-to-reach locations or unconventional sources like oil sands.

As a result, CO2 emissions from energy, which are already responsible for more than half of man-made greenhouse gases, are set to rise, even as concerns about climate change grow.

If we are to manage and reduce the impact of these emissions, then countries and industries across the world will need to significantly increase the application of technological ingenuity. But as I mentioned earlier, in that challenge lie considerable business opportunities, and I'll return to this theme later.

Current outlook: the three hard truths just got harder

Of course, the current economic downturn is adding to the complexity of our responses to the three hard truths.

Temporarily, it has reduced energy use and driven energy prices down, offering short-term relief for energy consumers. But it has also reduced funds available for new energy projects at a time when more are needed to meet future demand growth.

Recently, the International Energy Agency warned of severe oil shortages as early as 2013, once the world economy recovers and energy demand picks up.

Governments are also preoccupied with current economic problems, the task of creating policies required to address climate change becomes more difficult. But it's important that governments and industry don't become diverted from the longer-term goal of creating a larger and cleaner energy system.

Future energy scenarios

Given that a profound change is inevitable, how will it happen?

To help think about the future of energy and the choices we face, Shell has developed two global energy scenarios that we call *Scramble* and *Blueprints*, which describe different routes the energy system could take between now and 2050.

In *Scramble*, policymakers pay little attention to more efficient energy use until supplies are tight. Likewise, greenhouse gas emissions are not seriously addressed until there are major climate shocks.

In *Blueprints*, growing local actions begin to address the challenges of economic development, energy security and pollution. A price is applied to emissions - ie you 'pay to pollute' - giving a huge stimulus to the development of clean energy technologies, market driven-energy efficiency measures and CO2 management. The result is far lower CO2 emissions compared to *Scramble*.

Will national governments simply *Scramble* to secure their own energy supplies? Or will new *Blueprints* emerge from coalitions between various levels of societies and government, ranging from local to international, that begin to add up to a new energy framework?

There are already some examples of leaders exploring the *Blueprints* perspective of coalition. Since coming to office, the new US president Barack Obama has spoken of the need for international collaboration to meet the energy challenge.

We are already seeing discussions relating to a regional energy policy in the European Union, where CO2 emissions trading is already a reality and efforts are underway to develop viable commercial carbon capture and storage systems over the next decade or so. Australia is also looking at emissions trading, and several US states are collaborating on regional systems.

Here in India, too, the same key premises of the energy challenge - more energy, less CO2 - are already embedded within national policy and strategy. I'll return to a discussion of India's own energy challenge later on before discussing potential developments in the country's petrochemical sector.

Shell's response to the energy challenge

For our part, Shell is determined to provide energy and petrochemicals in responsible ways and to work as a Group and with our partners to serve our customers and investors as effectively as we can.

Shell has identified six pathways that we believe could contribute to what we describe as a *Better Blueprints* scenario. These are:

- Increasing the efficiency of manufacturing operations
- Establishing substantial capability in CO2 capture and storage technology
- Continuing to research and develop technologies that increase efficiency and reduce emissions in hydrocarbon production
- Aggressively developing low-CO2 sources of energy such as wind, solar, and natural gas and low-CO2 fuel options including hydrogen.
- Helping to manage energy demand by growing the market for products and services that help customers use less energy and emit less CO2
- Working with governments and advocating the need for more effective CO2 regulation.

At this point, I will turn the focus towards the global chemical industry and provide some examples of how Shell is using the six pathways to align and develop its chemicals businesses to meet the energy challenge and the needs of customers.

The energy challenge and the global chemical sector

For the global chemical sector, the medium- and long-term energy challenges are those already outlined - more energy, less carbon dioxide - and in a few moments I will look in more detail at implications and possible responses

However, in the short term, we are facing a fourth hard truth: a global economic slowdown and a consequent demand slump - for resources and goods ranging from chemicals to cars. For everyone in the chemicals sector, the key to long-term success is to remain competitive. But we must also factor in the need to respond to and meet the energy challenge.

Through this year and well into 2010, the immediate energy challenge we all face will be demand and price volatility.

Things changed very fast in 2008. At mid-year, oil was trading close to $150 a barrel, with industry analysts forecasting prices rising to $200 a barrel. For petrochemicals, the constant rapid climb in the oil price played havoc on costs as oil price volatility impacted feedstock costs and producers struggled to pass rises on to consumers.

Then the unpredicted happened. From $150 a barrel, oil began a rapid slide that took prices down to $60 a barrel in October and to about $35 a barrel by year end.

Since then, prices have risen slightly, hovering around $40 a barrel following a warning from the International Energy Agency that there may be oil supply shortages as early as 2010 when - and if - the global economy starts to recover and oil demand picks up. However, as anyone in the oil industry will tell you, predictions about price usually turn out to be wrong. So I won't be making any!

So what happened? Why did oil get so high-priced and why was the crash so steep?

Until July 2008, there was still a widely-held view that prices could and would keep on rising as the world would continue to buy more and more oil. There were also concerns about supplies being insufficient to meet growing demand from China and India, and the market kept climbing.

Yet at the same time as oil prices rose, there were clear signs emerging from US economic data that the world's largest economy and biggest global energy consumer was experiencing a slowdown in consumption.

Through the third quarter, however, as economic news from the US continued to worsen and the scale of the banking crisis began to unfold, the oil market started to dive on the realisation that over-supply was the likely reality as so many of the world's major economies slid into recession.

Soaring oil prices had already intensified competitive pressures in petrochemicals as a wave of new capacity started to come on stream in China and the Middle East. But as the world's biggest economies moved into recession,

demand from the intermediate and end users of petrochemicals and plastics has dived as consumer markets have slumped, causing some projects to be delayed and others to be re-evaluated.

Over 2008, according to American Chemistry Council estimates, polymer and chemical sales in the USA were down 14% from the previous year as construction and industrial production slowed dramatically.
We only have to look at the results facing some of the world's leading petrochemicals and plastics producers to see the impact of the global downturn. The number of plants temporarily closed or idled, and employees and contractors being laid off, continues to rise. And Shell is not immune with operating rates reduced in most regions.

Now, consider hypothetically that if global ethylene demand fell 15% - 20% in 2009, it would be a drop in volume similar to the whole of Europe's current annual ethylene capacity. Even a 3-5% fall in global ethylene demand would result in consumption reductions greater than India's annual ethylene output. These are sobering thoughts, and I'll return to the impact the current crisis may have on India later.

Meanwhile, let's return to the longer-term challenges.

Petrochemical products and transportation fuels share the same primary building blocks: hydrocarbons such as oil and gas. In the longer term, the chemicals sector is likely to face increasing costs and competition for traditional hydrocarbon feedstock from the power and transportation sectors, factors which are already driving investment in alternative hydrocarbon feeds and feedstock from coal or bio-resources.

While one could argue the theory that using hydrocarbons for chemicals feedstock, thereby diverting and 'capturing' their CO2 in the end product is better from a CO2 perspective than burning the hydrocarbons in transport fuels, we should be under no illusion that for the foreseeable future there will be competition for feedstocks.

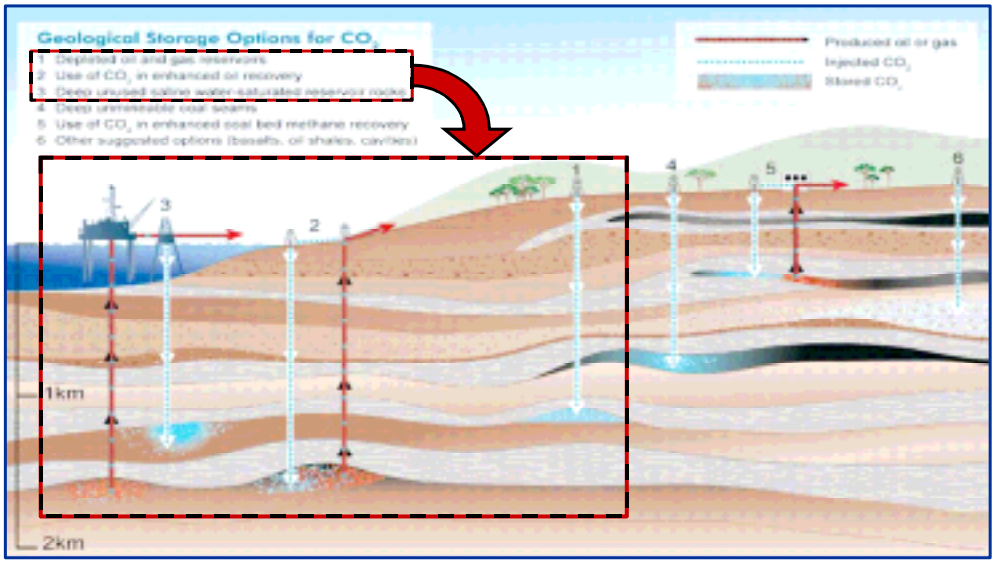
For our part, Shell has already made progress in the use of alternative feedstocks, and we are at the forefront of some fundamental new processes,

such as gas to liquids and coal to liquids, and working to develop feedstock from agricultural biomass.

Shell's coal gasification technology can convert coal to syngas, which can burn as cleanly as natural gas and also serve as chemicals feedstock.

Shell has also pioneered Gas To Liquids - or GTL - technology for over 30 years, and we're now engaged in a joint venture developing the world's largest GTL plant in Qatar. While GTL will help unlock the potential of the world's gas reserves, primarily for transport fuels, the core process offers many potential routes - via synthesis gas processing - to chemicals ranging from solvents to olefins and aromatics.

The capture and storage of carbon



But if the world is to achieve the 50% reduction in emissions of CO2 that the global scientific consensus deems necessary to prevent cataclysmic climate change, the global chemicals industry - along with the power generation, transportation and other industrial sectors - will also need ways to store or reuse CO2.

Recently, the United Nation's Intergovernmental Panel on Climate Change suggested that the development of large-scale carbon capture and storage systems could help to achieve over 50% of the required CO2 emissions reductions. In principle the idea is simple: capture CO2 from power plants, refineries and chemical plants and store it safely underground. With a wide range of geologic variations around the world, however, a selection of technical solutions are needed.

Shell has been developing carbon capture and storage technology and using injection techniques in oilfields to enhance production for many years. We are also currently involved in several collaborative projects aimed at developing commercial CCS systems.

To make world-scale technologies a global and effective reality, we will need governments to build a worldwide CO2 policy framework. At present, what we see developing is a combination of regional or local approaches, which are likely to result in distorted competition or measures to protect industries where CCS has been implemented against competition where it has not.

There is also the issue of incentives: CO2 capture and storage adds to business costs but yields no revenues. Government action is needed to support and stimulate investment quickly on a scale large enough to affect global emissions. Having looked at the supply side of the energy challenge, let's switch the focus to demand.

Helping the automotive sector develop lighter, more energy efficient vehicles

A major challenge for governments in developing economies worldwide is to achieve broader economic growth to create jobs and prosperity for a growing population.

In Saudi Arabia, for example, the government has ambitious plans to diversify its economy by developing industrial clusters - including automotive, appliance, construction, flexible packaging and metals processing - that will rely significantly on the Kingdom's energy and petrochemicals sectors.

Economic development policies like these set in the context of the energy challenge offer significant opportunities for the chemicals sector. For example, the automotive sector is looking to achieve better energy efficiency and lower CO2 emissions, both of which are targets our industry can help achieve.

Additives and lubricants that use chemicals are enabling fuel to burn more efficiently, and making engine and moving parts last longer. Plastics, composites and advanced materials are enabling vehicles to become lighter, cutting fuel needs and CO2 emissions, and to become more durable as stronger petrochemical products replace metals.

The construction and appliance industries offer similar opportunities. With buildings estimated to be responsible for up to 40% of energy use globally, the potential contribution of chemicals-based insulation products to improved energy efficiency and lower CO2 emissions is significant.

For Shell, these and other industries offer pathways to develop our chemicals businesses while meeting the energy challenge. For example, our SMPO production technology offers both cost and environmental advantages - including lower CO2 emissions, better energy efficiency and wastewater recycling - which are significantly better than alternative technologies for separate styrene and propylene oxide production.

At the same time, downstream products based on these materials such as expanded polystyrene and polyurethanes have important applications providing thermal insulation in the construction and appliance sectors and lighter, stronger products in the automotive sector.

At Shell, we are also seeing an increase in collaboration with partners and customers further along the supply chain in an effort to extend product performance or develop new applications. In a moment I will talk a little about how we plan to do this with our slabstock foam customers here in India.

By describing some of the ways Shell is aligning its chemicals business to meet the energy challenge, I hope I have illustrated the scope to build CO2 reduction opportunities that are not only good for society but also good for business.

Let’s turn to India.

India’s energy challenge and the implications for petrochemicals

About 18 months ago, the government here published a strategy document entitled *India: Addressing Energy Security and Climate Change*. It’s short, and gets to the heart of the country’s energy challenge very quickly. The opening lines say:

> “Poverty reduction and economic growth are the prime objectives of national policy. Energy is *sine qua non* of development.”

Today, India - with over a billion people - only produces 660KWh of electricity. Three fifths of India's population have no access to electricity, and only limited access to fuels such as LPG and kerosene. That's about 600 million people, equivalent to the combined populations of the USA and the European Union, who have very restricted access to energy.

Government figures suggest per capita energy consumption in India is less than 500 kilograms of energy (kgoE), less than one third of the global average of nearly 1,800 kgoE, and a fraction of the 8,000 kgoE consumed in the USA.

According to India's integrated energy policy, published in 2006, if the country is to meet its developmental goals it will need a massive increase in energy between now and 2030. This includes a four-fold increase in primary energy supply from 2003-2004 levels, and a rise of up to 600% in electricity generating capacity.

India's reliance on coal is also underlined. With the world's third largest reserves coal accounts for around 50% of industrial energy consumption and about 80 per cent of India's power generation. Energy from coal in India is about twice that of energy derived from oil, whereas world-wide, average energy derived from coal is about 30% less than energy derived from oil.

Currently, India produces about 25% of the oil it consumes. While extensive exploration is underway, India's strong reliance on imports of oil for its energy needs will continue for the foreseeable future.

Since 2004, India's economy has grown at a rate of over 9% a year, supported by an energy growth rate of less than 4% per year. But this gap between India's energy and economic growth rates owes much to the fact that India's economic growth has seen a boom in service industries rather than energy-intensive manufacturing. India is also a country where about 60% of the population is still employed in agriculture.

While India recognises that development requires more energy, it is also very clear that its must not be obtained at the expense of the environment. For

example, there is strong awareness that adverse impacts of climate change are already threatening the livelihoods of many Indians, especially the poorest.

Consequently, the emphasis is on developing clean energy technologies, such as clean coal, wind and solar power, and other renewables like bio-fuels. The government has also integrated climate change into India's national development planning process, and established the Prime Minister's Council on Climate Change.

Currently, India is spending 2% of GDP to develop and implement a range of climate change adaptation measures, while establishing a Ministry of Renewable Energy and a Bureau of Energy Efficiency.

Enshrined in national policy, is the objective that India's per capita greenhouse gas emissions should not exceed those of developed economies, even while India pursues development and economic growth.

Today, for example, India has the fourth highest wind energy capacity in the world. But the government recognises that while a growth in wind energy and solar capacity is desirable and possible, even with a 40-fold rise in capacity the contribution of renewables to national energy consumption is likely to be less than 10% by 2030. So India is committed to encouraging the development of new, cleaner technologies to exploit conventional fossil fuel resources.

Another important plank in India's energy policy is energy efficiency. Since the introduction and implementation of the Energy Conservation Building Code energy demand has reduced by more than 50% in new buildings being constructed near New Delhi. As I've already mentioned, energy efficiency offers great opportunities for insulation materials derived from chemicals.

So what does this mean for India's petrochemicals sector and its future development?

India's petrochemicals: energy challenges and opportunities

India's petrochemical sector has been growing fast. For the past ten years, domestic demand growth has been strong, driven mainly by consumption of polymers and synthetic fibres, which has prompted a wave of planned investment in new capacity.

In the medium to long term, India has plans to become a major force in global petrochemicals. Today, it ranks 12th in the world, and the third largest in Asia, after China and South Korea.

But in real terms, the sector is comparatively small. Although domestic ethylene capacity has increased 10 fold in a period of around 10 years, it is less than 3m tonnes a year. There is still a shortfall in ethylene equivalent supply, which is currently met through imports from the highly competitive, resource-rich and low-cost producers in the Middle East and, to a lesser extent, in eastern Asia.

On the surface, and particularly on the demand side, conditions look promising for petrochemicals expansion.

India is currently the 13th largest economy in the world by GDP, with forecasts suggesting it could become the 3rd largest economy by 2050. Population growth and GDP growth at average 8-9% means GDP per capita is forecast to grow at an average rate between 7- 8% pa until 2050.

The main growth sector of the economy has been the services industry, which has grown its share of GDP from about 40% in 1990 to well over 50% and is still rising fast today. India's population is also increasingly urbanised. Today, about 30% of Indians live in towns and cities. By 2050, over 40% will be urbanites. In tandem, with an expanding middle class, this urbanisation is increasing demand for consumer durables, and spending has, at least until recently, been further spurred by increasing household credit.

There is clearly room for considerable growth in petrochemicals, and per capita consumption comparisons underline this potential.

For example, today India’s chemicals consumption per person is about one tenth of the world average. For polymers, it’s about one fifth of the world average, but only a very small fraction of consumption in most developed countries. India’s synthetic fibre consumption is less than half the world average per capita.

A comparison with China is useful. Per person, China consumes nearly double the amount of synthetic fibre at roughly 3kg a year. In polymers, India consumes less than a third of China’s 10kg per capita per year.

We all need to wear clothes but we also all have to sleep. I myself can vouch for the fact that foam mattresses can offer a very comfortable night’s slumber. However with less than ten per cent of India’s billion plus citizens sleeping on foam-based mattresses, the potential growth for polyurethane foam consumption in India is obvious. Already, the market is seeing double-digit growth from this relatively low base.

But will these potential markets be realised anytime soon?

China has seen a boom in petrochemicals, driven by massive growth in that country’s manufacturing sectors. Today, China is a world leader in automotive, appliance and textile production. And while its logistics infrastructure still needs development and modernisation, significant progress has been made.

By contrast, India’s industrial sectors and infrastructure are less developed.

Dramatic increase in passenger cars

Infrastructure challenges but petrochemical opportunities

This poses challenges. Let's return to polyurethane foams. The potential market here is considerable, but still requires a lot of development in terms of appropriate products, logistics and technical and marketing expertise. Foam production in India is still fragmented and localised, with many small players, while transport infrastructure and distances involved make it difficult for regional producers to expand.

Infrastructure issues are being addressed, with plans and improvements of ports, roads and rail, but access to reliable power supplies still needs to be addressed.

And it's clear that India has ambitions to become a major player in the global car market, both for OEM and components manufacturing destined for both domestic and export markets.

A recent government study predicted that India's passenger car sales would rise from around 1 million in 2003-04 to beyond 3 million by 2015, with the value of the automotive sector doubling to over $60 billion by 2010, then doubling again to over $60 billion by 2016. That means lots of opportunity for petrochemicals.

Government petrochemical policies in India are certainly focused on supporting demand and production growth. Good examples are the Petroleum, Chemicals & Petrochemical Investment Regions (PCPIRs), which are to be set up to promote investment and make India a petrochemical hub. Meanwhile, Special Economic Zones will provide tax advantages.

What about India's current petrochemicals demand?

In 2007, Indian demand was around 3million tonnes of ethylene equivalent and around 1.7 million tonnes of polypropylene, with demand growth forecast to be between 9% and 10%, just ahead of GDP.

Currently, the ethylene equivalent market - comprising mainly polyethylene, styrene monomer and mono-ethylene glycol - is short while polypropylene is balanced to slightly long.

Near term, ethylene is expected to remain short, but Reliance's Jamnagar expansion will meet growing demand in polypropylene and will significantly reduce the monoethylene glycol import requirements.

Longer term, from 2011 and beyond, the key variable on India's local supply will be the ability of our national oil companies to deliver on increased capacity announcements. There are many independent assessments that suggest these projects may slip in timing, while some announcements will not materialise.

On an inter-regional level, it is widely anticipated that the Middle East will experience increasing length, both in ethylene and propylene equivalents which are significantly greater than the projected Indian import market requirements. Current imports into India are already primarily from the Middle East through existing logistics and distribution channels. This means incremental imports are easier to implement.

Against this background, what will the energy challenge mean for India's petrochemicals?

Once again, I think the emphasis will be on more energy, and less carbon dioxide. But as we have seen there are constraints and targets being promoted by India's government.

A key challenge will be obtaining petrochemical feedstock. India already relies heavily on imported oil and gas, and companies based here have taken stakes in Middle East fields and are working hard to find and develop new resources.

Future feedstocks from bio-waste?

An obvious option for the future is the development of new feedstocks based on coal and bio-resources. India is coal-rich and technologies are available and being developed that offer clean routes for coal-to-chemicals. But there is no doubt that the current slump in oil prices makes the coal-to-chemicals route less attractive.

That said, China is still pushing ahead on a programme designed to provide significant coal-based chemicals capacity.

It has been suggested that undeveloped land in India could be used for bio-fuel and bio-feedstock cultivation. Feedstock from bio-waste - the surplus material from agricultural production is also an option. However, using existing agricultural

land for bio-feedstock requires careful management to avoid the risk of diverting food production and driving up prices, as some would claim has happened in North America. If biofuel production is to scale-up to help meet growing demand then non-food raw materials need to be developed.

Another focus will surely be energy efficiency. Some people point out that doing more with less has always been the driver for industrial chemistry, but the Shell experience, which I mentioned earlier, shows that sizeable energy efficiencies are not only identifiable but achievable, too.

As the changing dynamics of the energy markets impact the price and availability of chemical feedstocks, those chemicals players that are closely integrated with oil processing - and have the ability to optimise process streams and adapt to different feedstocks - are clearly best placed to succeed.

This brings me to India's new PCPIRs. They make very good sense, offering opportunities for integration with refining and chemical manufacturing in world-scale centres or clusters where services and utilities can be shared and related industries - including R&D - can also develop, extending the value chain. As new builds, they would of course have the advantage of being able to incorporate the latest technologies for efficiencies and emissions reductions, while established facilities may have to invest in costly retrofits.

These new refining and petrochemical centres could also provide the critical mass needed to make large scale carbon capture and storage systems available. But as I mentioned earlier, the development of these systems will be heavily influenced by the regulatory and investment regimes that are developed by and between governments worldwide.

There are huge opportunities, too. If India's automotive industry continues to develop at anticipated levels, then the petrochemicals and plastics sectors can make a significant contribution to improved energy efficiency through products ranging from lighter and stronger vehicle components to enhanced lubricant additives. Perhaps India will become the centre of plastic car development and production?

The construction sector also offers very significant market opportunities, particularly through insulation materials made from polyurethanes and polystyrenes that can markedly reduce energy requirements for cooling or heating buildings.

There is also potential in the renewable energy sector, where petrochemical products have uses in the components of wind turbines and solar power systems. Perhaps India could become the leader in these technologies in the future?

India's petrochemicals and plastics today

While there is good reason to be optimistic about the long-term future for India's petrochemicals and polymers industries, the current business environment has been difficult since Q3 2008. Prices have fallen and output fell slightly, too, although the mood at last month's PlastIndia conference and exhibition seemed upbeat, with press reports indicating almost full capacity utilization among polymer producers.

The government believes that the fundamentals of India's economy are strong and that the impact of the global economic downturn will be limited. Just last week the Home minister suggested that the Indian economy is likely to be on the up again by October, noting that growth of well over 7% had been achieved in 2008, largely as a result of continued domestic consumption.

At PlastIndia last month, the country's president predicted plastics industry growth of about 5%/year through 2015, with polymer consumption doubling to around 11 million tonnes a year.

A major driver for future growth is India's economic development program, which includes over $500-billion for infrastructure investment. India's consumers have apparently also been buying 2,500 cars, 5,200 washing machines and almost 20 million bottles of water every day.

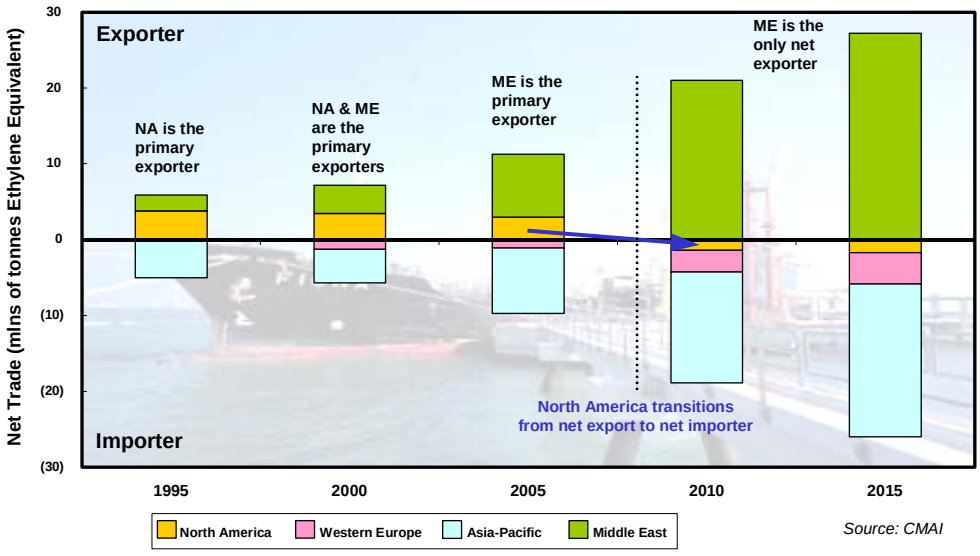
But will this last? Some observers argue that government infrastructure investment has so far masked some of the effects of the global economic

slowdown. There are reports that half a million jobs have been lost, and that pay cuts are being implemented to save others. Certainly, Q3 data indicated a slowdown in economic growth to between 5%-6%.

Given India's reliance on imported feedstocks for downstream petrochemical and polymer production, the availability of very large quantities of low-cost material in the Middle East, and the slowdown in export demand, some observers are questioning the wisdom of implementing investment plans for large scale bulk petrochemicals and polymers manufacturing capacities at this time. As I mentioned earlier, in principle these hubs are the way forward, as we've found in the Shell group. But it's important that timing and strategy are aligned.

The build up of China's ethylene and derivatives capacity in tandem with new projects in the Middle East will undoubtedly result in significant surpluses of bulk products. In the next year or so, the Middle East is expected to become the only net exporter of ethylene and derivatives, and the region's role in export markets is expected to strengthen through 2015.

Changing Trade Flow Pattern of Ethylene Derivatives



Source: CMAI

Is it therefore more cost-effective for Indian polymers producers to rely on imports to make up for shortfalls in domestic supply?

Can new plants in India compete against low-cost producers in the Middle East? Or will there be a temptation to use protectionist measures to safeguard domestic investments? According to the World Trade Organisation, in the first half of 2008, chemicals-related actions accounted for 16 of the 54 anti-dumping measures implemented. Of these, 11 were by India.

Shell in India

Before I move to my conclusion, I'd like to say a few words about Shell in India.

As a group, Shell has already invested nearly $1 billion in India, where it is the only global integrated oil major to have a fuel retail license.

In addition to being a major private sector supplier of crude, products, chemicals and technology to public/private sector oil companies, Shell also has key interests in lubricants, bitumen and LPG while operating an LNG receiving and re-gasification terminal, as well as a significant Technology centre and now shortly a financial shared services centre.

India has also been a focus country for investments from the global Shell Foundation, which has committed resources across seven programmes - primarily related to clean energy - and has already spent over $5.5 million to date impacting more than 119,000 households and 195 entrepreneurs.

Currently, we import some petrochemicals, but Shell is constantly evaluating opportunities for new marketing and manufacturing investments and we are keeping India in our sights. Certainly, we've recognised the growing demand for polyester for textiles and for PET packaging in India, which could well become the next leading centre for the global polyester industry.

Shell's new mono-ethylene glycol plant in Singapore will start up at the end of this year, and it's conveniently located to serve the Indian market. In fact, this new plant, which will use Shell's new OMEGA technology, is a good example of technology responses to the energy challenge. It only produces MEG, and enjoys highly efficient conversion rates with excellent environmental performance.

Last year Shell opened a new technology centre in Bangalore. The Shell Bangalore Laboratories (SBL) will carry out research and development and provide technical support across a range of products including polyols. The technical service team at SBL will provide support to polyols customers not just in India, but across the globe.

As an emerging market, the focus has generally been on developing foam volume rather than high quality. At the Bangalore centre we will work with customers to reduce costs by optimising foaming processes, improve standards of foam quality but also to drive higher HSSE (health, safety, security and environment) performance.

The technical support unit based at the Shell Bangalore Laboratory is staffed by locally-recruited experts with experience across a range of polyurethane applications and markets. By offering high-end technical careers in a global business, Shell Technology India will give Shell long-term access to cutting-edge Indian talent and resources. It currently employs around 250 professionals and plans to more than double that number in the near future.

Given what I said earlier about the value of integrating chemicals with other operations, it's likely that any future Shell chemicals investment here would need to be in an integrated project with Shell upstream or downstream, or as part of a world-scale joint venture. In the meantime we are certainly keeping tabs on what promises to be a very dynamic sector, and looking for opportunities such as the Bangalore Technology Centre to offer an attractive proposition to customers.

Conclusion

So to sum up, the whole world and the global petrochemicals industry face a challenging future, requiring more energy but less carbon dioxide.

A combination of energy and technology and collaboration along the value chain will be essential for long-term, sustainable success. But we will also need to ensure that our industry is able to attract new people into its ranks to provide the creativity and leadership to make this happen.

India is certainly brimming with some exceptional human talent. And whereas in the past, we suffered a brain drain with up to 25 million Indians living and working overseas, reports have recently spotlighted the brain gain as significant numbers of young, highly educated people return “home”. However, we face stiff competition from other sectors to recruit the new generation of engineers, technologists and managers required to meet the challenges of the future.

The chemical sector - both globally and in India - holds many of the keys that will allow society to meet the energy challenge. But in the final analysis, the industry will be judged by our peers, consumers, governments and society at large, on our ability to optimise our energy efficiency and minimise our CO2 emissions while delivering products and services that make the world a better and sustainable place to live.

Thank you.