Energy Poverty is one of the most pressing problems the world faces today. According to some estimates, about 1.5 billion people have no access to electricity (not even a light bulb). To that end Mr. Jatin Nathwani, executive director of the Waterloo Institute of Sustainable Energy (WISE), launched affordable Energy for Humanity (AE4H), a global coalition of more than 100 people from 27 institutions in 12 countries. The objective of AE4H is “Power to the People”. The edition of Journal starts with lofty goals set by AE4H and some of research areas focused by AE4H.

Every year, the International Energy Agency (IEA) releases the “World Energy Outlook”, and you will find the excerpts of the report. It talks about how the oil and gas markets will evolve during the year, and also how renewable energy and electric vehicles are expected to take huge strides.

The other major theme addressed in this journal is the “Fourth Industrial Revolution”. While this article is not fully on energy, the issue of utmost importance and throws light into how the “Fourth Industrial Revolution” is affecting our lives.

On the subject of Climate Change, we have an interesting article on how Major Global Oil Companies are adapting themselves to meet the climate change goals. Back in India, there is a talk of merger of some of the Oil and Gas Companies, and we have an article that gives an inside view of the merger talks.


Finally, we take a look at some of the bidding that took place for Wind and Solar Projects.

We hope you enjoy this edition of the Journal. Please let us know your feedback.

MADHAVAN NAMPOOTHIRI
FROM THE PRESIDENT’S DESK

To start with we deeply regret that the last issue of the journal (Oct. – Dec. 2016) has got to be skipped due to unavoidable circumstances beyond our control. Hence the quarterly volume – LXVI Books 3 & 4 have got to be clubbed together for the quarters Oct. – Dec. 2016 & Jan. – March 2017 respectively. We seek the indulgence of the readers for the inconvenience caused.

ENFUSE, as in the past had successfully conducted the OGCF 2017, on behalf of M/s. Chennai Petroleum Corporation Limited as part of their corporate responsibility during 16th January to 15 February 2017. There were ten events at academic institutions for the students, six LPG clinics for the house wives and two driver clinics for the drivers, directly interacting with a population of about 2000 individuals. Indeed it was a wonderfully rewarding experience.

In addition as part of OGCF 2017 the Interactive Session “Regenerative Economy – Road map for Sustainable Development” “was held on 10th February 2017 for the benefit of the Industry members to drive home the point that we cannot address the challenges of tomorrow with the policies and strategies of yesterday. The global challenges of food, energy and water security, climate change and sustainable Livelihood creation will need far more impactful and innovative solutions. The Interactive session emphasized that it is no longer a debate about making lifestyle choices, it is about finding life-

changing solutions required for the world’s poor and most vulnerable.

Also the Interactive Session focused on the new approach, popularly known as the Green GDP, is expected to reflect the true dimensions of economic growth.

The relevant NEWS coverage with photographs are appearing in other pages of the journal.

During the last quarter of 2016 I had the privilege of interacting with Dr. Jatin Nathwani, Executive Director for Waterloo Institute for Sustainable Energy (WISE) and had a first-hand information on how he is piloting the movement “Affordable Energy for Humanity” (AE4H). The Institution AE4H is a global coalition of more than 100 people from 27 institutions in 12 countries. A detailed write-up is appearing in the other pages of the journal for your perusal.

Also be invite you tom have a glimpse on Fourth Industrial Revolution appearing as the third article in this issue of them journal reminding us that we stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another.

With this I will conclude with greetings to all of you!

S.RAMALINGAM
ENFUSE NEWS

22nd November 2016:

President Attended WISE public lecture on demand side management, Micro -Grids, Demand Response and Reducing the Need to Overbuild Capacity at Waterloo University, CANADA.

December 13th, 2016:

Mr S Ramalingam, President, Energy & Fuel Users’ Association of India had a special invitation to participate in the public lecture organized by University of Waterloo. Dr. Daniela Roeper from Borealis Wind delivered the lecture. Borealis Wind has designed a wind turbine de-icing retrofit (the “Borealis De-icing System”). This system is an internal air heating system designed as a retrofit for wind turbine blades. The purpose of this system is to de-ice the blades of the turbine, once it has shut down due to ice build-up.

Event organised by the Waterloo Institute for Sustainable Energy Canada on Thursday, 15th December 2016

Sankaran Ramalingam, President, Energy & Fuel Users’ Association of India (ENFUSE), delivered a Public Lecture on the topic “Energy Economics – towards sustainable development & And Green GDP “.Current methods of calculating economic growth fail to account for environmental depletion, degradation and loss of biodiversity. In turn, industrial development and economic growth and reflective of the creation of material wealth but fail to cultivate environmental and social gains.

The growing discourse on sustainability has sparked attempts to recast traditional means of calculating GDP which account for the environmental factor. This new approach, commonly referred to as the ‘Green GDP’, seeks to broaden the scope of this measurement through the addition of social and environmental dimensions to what was once a solely monetary value. Growing evidence suggests that limits to future growth will be defined more by vulnerabilities flowing from social inequities, environmental degradation and climate change than any other factor.

This discussion advocates a paradigm shift ushering in strong market drivers to support corporate action for evolving a Green GDP Economic Model. Deliverables such as policies, regulations and corporate affairs were addressed as an integral part of developing a green GDP and inclusive growth model.

OGCF 2017(January 16th to February 15th 2017)
- A detailed coverage:

ENFUSE, as in the past has successfully conducted the Mass Awareness Campaign for effective utilization of Petroleum Products on behalf of M/s. Chennai Petroleum Corporation Limited as part of their corporate responsibility during 16th January to 15th February 2017. The programs captioned OGCF 2017 was conducted in 9 Colleges and 1 Polytechnics in and around Chennai. Further two clinics were held for groups of drivers. Besides Six LPG clinics were held for the benefit of housewives highlighting safe and economic usage of cooking gas. The programs were well received by all the participants and ENFUSE can boast to have the benefit of directly interacting with about 2000 individuals during the fortnight. The Awareness programs on the importance of the need to conserve precious cooking gas fuel, and also the methods to be adopted in achieving these goals was showcased by Mr. K Sadasiva Chetty, Vice President, HQ, ENFUSE with faculty support from Committee Members.

ENFUSE acknowledges with thanks the faculty support received from Mr. K R Govindan, Mr. K Karunamurthy and Mr. S. Murugesan besides the Administrative support from M/s D Gomathi and Mr. C O Vijayan.
A view of the audience at Jagan Research Associates Pvt Ltd

Mr. K Karunamurthy delivering the lecture on OGCF 2017 at Subham Avenue, Madhavaram

Mr. K Sadasiva Chetty,
Vice President HQ delivering the lecture at Ramakrishna Polytechnic College - OGCF 2017

Mr. S Ramalingam,
National President, ENFUSE delivering the lecture at Anand Institute of Technology
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Power to the People

DRIVING A REVOLUTION IN AFFORDABLE ENERGY FOR HUMANITY

More than a billion people with no access to modern electricity is a global injustice. Change will require a massive, coordinated investment of research, resources and resolve.

To truly grasp what it means to be energy poor — and to understand vast global disparities in access to electricity — consider this simple analogy.

1.5 billion People in the world have, say, a light bulb and a washing machine. Another 4 billion have only the light bulb. And, **1.5 billion have neither**.

Factor in the lack of access to modern fuels such as gas, and fully a third of humanity — that’s roughly **2.5 billion people** — live on the margins of society.

It’s an enormous global imbalance, and one that is not confined to the developing world. Many remote indigenous communities right here in Canada are also energy poor because they rely on diesel fuel that’s trucked or flown in at exorbitant prices.

Experts say the absence of electricity has an enormous impact on economic productivity, health, education, and social and cultural development. It’s one of the main obstacles to human development, touching lives in ways that we in the West can scarcely imagine.

To that end, Jatin Nathwani, executive director of the Waterloo Institute for Sustainable Energy (WISE), launched Affordable Energy for Humanity (AE4H), a global coalition of more than 100 people from 27 institutions in 12 countries — including Waterloo’s counterpart in Germany.

The Karlsruhe Institute for Technology and leading researchers at institutions including Cambridge, Oxford and Berkeley.

AE4H harnesses global muscle and brainpower to transform the lives of those living without electricity.

**Energy poverty: destroying productivity and potential:**

“These people are essentially the poorest in the world, and when night falls, it is pretty harsh,” says Nathwani, who is also a professor of civil and environmental engineering at Waterloo.

“If you take the view that energy is a fundamental enabler of human betterment — one that is intricately linked to quality of life — access to it remains a very powerful driver for high levels of achievement.”

Zimbabwean Chiedza Mazaiwana agrees. As an advocacy officer for AE4H—founding partner Practical Action — a non-governmental organization based in the United Kingdom — she says the lack of affordable, accessible electricity destroys the productivity and potential of millions.

Rural African women, in particular, walk for hours each day — sometimes 10 kilometres or more — to collect firewood for cooking and washing. When darkness falls, chores are done by candlelight, kerosene lamp, or the dying embers of an indoor cooking fire.
Lack of electricity impacts all aspects of life. Women give birth in the dark. Fumes from cooking lead to health problems and premature death. Children can’t study at night. There is no storage for vaccines or other medicines, no light or electrical equipment for health care workers. Crops must be watered by hand.

What precious electricity there is often goes only as far as to charge a cell phone or power a single light bulb. For billions of people, anything more than that — powering up a fridge, say, or a TV — is beyond comprehension.

‘The rationale for action now is compelling’

On the other hand, we in the West expect our power to be reliable, we expect it to be fast, and we certainly don’t expect it to disrupt our day. Nathwani describes the global energy that we rely on as a vast, interconnected system that extracts huge amounts of primary energy yet leaves millions to “scour the forests for twigs and branches for basic needs.

“Energy poverty remains a barrier to economic well-being for such a large proportion of humanity that the rationale for action now is compelling,” Nathwani says.

“The recognition of this issue has come full force to the highest level of discussion, almost at par with the challenges of climate change. It brings into focus the most formidable scientific challenges of this century: How do we get to a clean energy future that is essentially non-carbon?”

Renewable energy technologies such as solar panels, wind turbines and small-scale hydro plants can generate power on a smaller scale — and these technologies promise to bring power to rural, highly impoverished places without the need to invest in a huge central grid.

Power imbalance:

Energy access around the world:

Does this sound fair to you? One hundred per cent of people in North America have access to energy, but only 18 per cent of people in Uganda do.

This map shows how energy access varies widely around the world.

Energy use around the world:

Did you know the average Canadian uses 16,000 kWh per year of energy? In Germany, that number looks more like 7,000 kWh per year, and in India, that number falls to 700 kWh per year.

To put those numbers in perspective, consider this: the average freezer consumes 350 kWh per year, and a clothes dryer eats up 930 kWh per year. The average person in Kenya and the average person in Haiti use a fraction of the energy that our everyday appliances consume (at 160 kWh and 50 kWh hours respectively).

See how energy use compares among different countries.
Household air pollution and health:

Energy poverty can have deadly consequences. Approximately 3 billion people cook and heat their homes using open fires and simple stoves burning biomass (wood, animal dung, crop waste) and coal.

4.3 million People die prematurely each year from illness attributable to household air pollution caused by use of solid fuels for cooking. These deaths include:

- 12% pneumonia
- 6% lung cancer
- 22% chronic obstructive pulmonary disease (COPD)
- 34% stroke
- 26% ischemic heart disease

Technology alone won’t win the battle:

But Nathwani says technological innovations are not enough on their own — because solutions must ultimately be adopted in the cultural context of the way people live their lives.

The key is to have a deep supply chain of expertise to provide solutions at both a price point and performance point that are sustainable.

“I have absolutely zero doubt in our ability to succeed,” Nathwani says. “But let’s be realistic — this will take time. We sit on a bed of established technologies and solutions that we can begin to implement. And we can learn from those who are implementing them to actually understand what the barriers are: what’s not working in the field, why good intentions go awry.

“We can learn from that and feed into solutions that are already being implemented, and then the breakthrough technologies will improve things by an order of magnitude in terms of price and reliability.”

Many of the technologies themselves are still new. They need to be more durable, they must be simple, they have to meet people’s needs (because what works in Rwanda, say, won’t necessarily work in Zambia), and they must be more efficient.

Most of all, they must be affordable for the poorest people on the planet.

“Affordability” means that the cost of basic energy services is less than 10 per cent of disposable income. So, for someone who lives on less than $2 a day, their energy cost must not exceed 20 cents a day.

“One can’t just wait for this,” Nathwani says. “It has to have a mission and a clarity of purpose to deliver the fundamental physics and material-design breakthroughs that would influence the next set of devices.

“You can’t be naïve about it because imposed solutions don’t work. You can’t say, ‘Here’s your big black box and isn’t it great?’”
Taking a shot at something big and important:

Along with its partners, the University of Waterloo is taking a shot at “doing something big and important,” adds Nigel Moore, manager of global programs and initiatives at WISE.

“Now that we’ve got over 100 individual researchers and practitioners from 27 institutions in 12 countries around the world saying, ‘I’d like to be a part of this initiative,’ our job is to marshal this enthusiasm,” Moore says.

“We want to engage in activities where there are tangible links between the things we’re learning in the field in energy-poor communities and the innovation that’s going on in the laboratories in places like the University of Waterloo. Because if we don’t understand what the needs of these people are — but we’re going ahead and trying to create technologies for them anyway — there’s a good chance they won’t work.”

What’s next?

The wider mission for AE4H will come from a blueprint developed out of the Waterloo Global Science Initiative’s (WGSI), Open Access Energy Summit, which took place April 24 to 27 in Waterloo.

A partnership between the University of Waterloo and the Perimeter Institute for Theoretical Physics, WGSI hosts bi-annual summits, bringing together researchers, policy makers and community leaders from around the world to develop and implement solutions to some of the world’s most pressing challenges.

The summit’s goal is to translate research into action, to foster connections between different organizations and disciplines, and to promote the development of strategic partnerships to meet the global energy access challenge.

4 ways to open energy access:

The waterloo researchers helping power a global revolution:

There is no magic bullet, no single solution that will address the massive global Energy inequities that leave billions of people with little or no access to electricity. Instead, change will come from connecting the ideas, innovations and experience of some of the world’s top minds.

Affordable Energy for Humanity (AE4H) focuses on four broad areas of research with the greatest opportunity to create meaningful, sustainable energy change.

RESEARCH AREA 1

Generation, Devices and Advanced Materials:

Promise and potential: Next-generation batteries

Researcher: Linda Nazar, faculty of science

Next-generation batteries are an emerging market with unlimited potential — and Waterloo chemistry professor Linda Nazar is eager to see her team’s extraordinary labours pay off.

Nazar, who was recently named an Officer of the Order of Canada for her advancements in battery systems and clean-energy storage, is contributing to breakthroughs in the design of rechargeable batteries for grid storage, electric vehicles and other clean-energy technology.

“Our research team and others at the University of Waterloo are working on a lot of different battery technologies where we’re starting to see the hard efforts that we’ve put in over the last decade really paying off in terms of making batteries that have higher energy
density, that are safer and also have longer cycle life,” says Nazar, who along with colleagues at the Waterloo Institute for Nanotechnology, Zhongwei Chen and Michel Pope, are planning to launch an Electrochemical Energy Research Centre at the University.

Their work could have huge ramifications for energy-poor developing countries.

“In impoverished countries where there’s an abundance of sunshine, it’s critical to be able to store renewable energy in affordable energy storage systems to allow for load leveling and also for storage at night or even off-season storage,” Nazar says.

“That allows communities that are limited in their electrical resources to have a cheap, abundant source of energy to power activity in the evening and when the sun isn’t shining.”

RESEARCH AREA 2

Information and Communications technologies for Energy System Convergence:

Reducing the carbon footprint, improving energy efficiency:

Researcher: Srinivasan Keshav, Faculty of Mathematics.

Energy poverty is one of the biggest challenges facing humanity, according to Waterloo computer science professor Srinivasan Keshav.

“More than one billion around the world don’t have access to good forms of energy,” Keshav says. “The only energy they have is their own human labour, so if they want to dig a trench they have to do it by hand. How much firewood they can carry determines what they’re going to cook. That’s really what it comes down to.”

Keshav and his research team are focusing on greener, more efficient sources of energy that will ultimately help address these inequities.

“The work I’m doing in this lab is focused on two things,” Keshav explains. “One is to reduce the carbon footprint. The other is to improve the energy efficiency of systems that generate, transmit and consume energy — everything from power plants to the solar panels on your roof.

“Solar efficiency is going up and the costs are coming down at the same rate as costs have gone down for electronics. The same thing is happening with lighting. The technology is now coming into place which allows us to put a panel on the roof, [add] storage and efficient lighting — and you have the ability to transform lives.

“At some level the changes come not just from technology but from policy, not from research but from imagination. We make it possible for somebody to imagine a different future — and that perhaps is the biggest thing we do.”

A smart grid for smarter energy:

Researcher: Catherine Rosenberg, Faculty of Engineering

Just as Smartphone technology has come to dominate the way we communicate, the future of 21st-century electricity may well belong to the smart grid.

The smart grid is an intelligent infrastructure that uses information technology — sensors, communications, automation and computers — to improve the way electricity is delivered. It also allows for renewables such as wind and solar power to be part of the equation.

“A lot of people do not have access to the electrical grid the way we do,” says Catherine
Rosenberg, a professor of engineering and Canada Research Chair in the Future Internet at Waterloo. “There are two types of technologies that can have a major impact on the smart grid. The first technology is renewables — solar, wind. The second is energy storage.”

Rosenberg, who is collaborating with computer science professor Srinivasan Keshav, says that having access to renewable energy — solar panels, for example — and some storage would allow communities without grid access or with poor grid access to be self-sufficient.

Just as importantly, access must be affordable, and Rosenberg is optimistic that storage will become cost-efficient in the near future.

“There are more and more needs for energy storage— for example for electric vehicles — the price of energy storage is going to decrease,” she says. “We are in the business of designing systems by integrating many technologies and showing how those systems should be operated in a cost-efficient manner.”

RESEARCH AREA 3

Environmental and Human Dimensions of Energy Transitions:

Energy and sustainability: Lessons from the North

Researcher: Paul Parker, Faculty of Environment

Energy poverty is not confined to the developing world. There are nearly 300 remote communities across northern Canada — about 170 of them First Nations — and most rely on diesel generators with fuel flown in or trucked in via ice road.

It’s not only environmentally damaging, it’s also incredibly expensive — up to $1 per kilowatt hour — so building capacity to get energy from renewable sources is the preferred option.

“In our First Nations communities, we see both huge need and huge opportunity,” says Paul Parker, a professor in the Faculty of Environment. “We are here to work with communities to achieve what they want. The first question is, ‘What future do you want?’ And then it’s, ‘How do we design, evaluate and implement it?’

“The University of Waterloo is probably most famous for its technical capacity, but we also realize that technical capacity needs to have social context. We need the social scientists to work with our engineers and technicians in the North. Our students are fantastic. We’ve trained economic developers for communities across the North where they look and they see an opportunity and they say, ‘Let’s take those solutions to as many communities as possible,’ ” Parker says.

“We already have the technology to make these things happen, so [it’s about] the implementation. And what we are learning in Canada has [global implications] in other parts of the world that experience energy poverty.”

RESEARCH AREA 4

Micro grids for dispersed power:

Micro grids and the power of decentralization:

Researcher: Claudio Canizares, Faculty of Engineering

As flaws in centralized power grids become apparent — their vulnerability to disruption and dependence on planet-warming fossil fuels — the time has come for renewable energy micro grids to take centre stage.
“Here at Waterloo we have a lot of expertise to provide in micro grids, not only to Canada but to the world, from simulation and modelling to hardware and social interactions with communities,” says Claudio Cañizares, a professor of electrical and computer engineering at Waterloo.

Scientists are trying to transform micro grids — which can operate independently or in conjunction with main power grids — into renewable energy-based systems by introducing solar and wind power. Challenges being addressed by research at Waterloo include making the systems economically feasible, and learning to manage the variability inherent to renewable energy sources like wind and solar. Cañizares and his fellow researchers are doing both theoretical work — simulation, modeling, optimization — and applied science so they can understand how the controls work in different environments.

“One of the main motivations for our work here is to try to improve or facilitate the introduction of these renewable sources and to move away from diesel in the remote, mostly indigenous, communities in Canada,” Cañizares says.

Ultimately, Cañizares believes the impact of affordable energy access will change lives.

His research partners in northern Chile, for example, are seeing young people who had left their communities return once affordable energy sources are introduced, and business opportunities cropping up that didn’t exist before.

“We have come a long way,” he says. “We believe Waterloo is particularly well-positioned ... people are paying attention.

Source: Sustainable Waterloo Region- Report

Gujarat to develop hybrid project using Solar and Wind energy

At a time when the demand for solar projects is dwindling, the Gujarat Energy Research and Management Institute (GERMI) is developing a hybrid technology using solar and wind energy to generate power. The institute is doing research on developing a hybrid rooftop solar-wind tower amid rising concerns over land utilization and infrastructure costs.

According to GERMI, this will not only improve land utilization, but also reduce the cost of transmission infrastructure. The institute is planning to conduct a trial run for the project this year.

“We are working on developing a hybrid technology that enables both solar and wind power generation at a single place. This will help in proper utilization of land which is currently not being fully achieved,” said T Harinarayana, Director General, GERMI.

The institute also maintained that the new technology will address several other issues including grid connectivity and infrastructure-related challenges, besides cutting down costs.

Source: Business Standard
Excerpts from the report developed by INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency’s aims include the following objectives:

# Secure member countries’ access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions

# Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.

# Improve transparency of international markets through collection and analysis of energy data. n Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.

# Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders. IEA member countries:

Australia    Austria    Belgium    Canada    Czech Republic    Denmark
Estonia    Finland    France    Germany    Greece
Hungary    Ireland    Italy    Japan    Korea    Luxembourg
Netherlands    New Zealand    Norway    Poland    Portugal    Slovak Republic    Spain
Sweden    Switzerland    Turkey    United Kingdom    United States. The European Commission also participates in the work of the IEA.

The Paris Agreement on climate change, which entered into force in November 2016, is at its heart an agreement about energy. Transformative change in the energy sector, the source of at least two-thirds of greenhouse-gas emissions, is essential to reach the objectives of the Agreement. The changes already underway in the energy sector, demonstrating the promise and potential of low-carbon energy, in turn lend credibility to meaningful action on climate change. Growth in energy-related CO2 emissions stalled completely in 2015. This was mainly due to a 1.8% improvement in the energy intensity of the global economy, a trend bolstered by gains in energy efficiency, as well as the expanded use of cleaner energy sources worldwide, mostly renewables.

The renewables-led transformation of the power sector has given focus to a new debate over power market design and electricity security, while traditional energy security concerns have not gone away.

The world’s energy needs continue to grow, but many millions are left behind in our main scenario, a 30% rise in global energy demand to 2040 means an increase in

Word Energy Outlook
Consumption for all modern fuels, but the global aggregates mask a multitude of diverse trends and significant switching between fuels. Moreover, hundreds of millions of people are still left in 2040 without basic energy services. Globally, renewable energy.

A cumulative $44 trillion in investment is needed in global energy supply in our main scenario, 60% of which goes to oil, gas and coal extraction and supply, including power plants using these fuels, and nearly 20% to renewable energies. An extra $23 trillion is required for improvements in energy efficiency.

Climate pledges and climate goals Countries are generally on track to achieve, and even exceed in some instances, many of the targets set in their Paris Agreement pledges; this is sufficient to slow the projected rise in global energy-related CO2 emissions, but not nearly enough to limit warming to less than 2°C. China’s transition to an economic model oriented towards domestic consumption and services plays a critical role in shaping global trends.

With regard to efficiency, we highlight in WEO-2016 the potential for further improvement in the performance of electric motor systems, which account for more than half of today’s electricity consumption in a range of end-use applications (e.g. fans, compressors, pumps, vehicles, refrigerators). In the industrial sector alone, additional cumulative investment of around $300 billion in the 450 Scenario reduces 2040 global electricity demand by about 5% and avoids $450 billion in investment in power generation. Capturing these energy savings requires a system-wide approach that encompasses not only strict regulation of motors and motor-driven devices, but also larger uptake of variable speed drives and the implementation by operators of other measures to enhance the efficiency of the system as a whole, such as predictive maintenance.

Electric vehicles ready to move

Electricity takes an ever-larger share of the growth in final energy consumption: from just over one-quarter over the last 25 years, electricity accounts for almost 40% of additional consumption to 2040 in our main scenario and for two-thirds in the 450 Scenario. Non OECD countries account for more than 85% of the increase in electricity use in both scenarios, but this is also one of the few energy carriers that gains ground within the OECD. Although a small factor in total power demand, the projected rise of electricity consumption in road transport is emblematic.

Renewables break free

The electricity sector is the focus of many Paris pledges: nearly 60% of all new power generation capacity to 2040 in our main scenario comes from renewables and, by 2040, the majority of renewables-based generation is competitive without any subsidies. The policy focus shifts to integration. Cost reductions for renewables, on their own, will not be enough to secure an efficient decarbonisation of electricity supply. Structural changes to the design and operation of the power system are needed to ensure adequate incentives for investment and to integrate high shares of variable wind and solar power. The rapid deployment of technologies with low short-run costs, such as most renewables, increases the likelihood of sustained periods of very low wholesale electricity prices. A careful review of market rules and structures is required to ensure that generators have ways to recover their costs, and that the power system is able to operate with the fuel.
Oil markets could be in for another bumpy ride a near-term risk to oil energy and water: one doesn’t flow without the other the inter-dependencies between energy and water are set to intensify in the coming years, as the water needs of the energy sector – and the energy needs of the water sector – both rise. Water is essential for all phases of energy production: the energy sector is responsible for 10% of global water withdrawals, mainly for power plant operation as well as for production of fossil fuels and biofuels.

These requirements grow over the period to 2040, especially for water that is consumed (i.e. that is withdrawn but not returned to a source). In the power sector there is a switch to advanced cooling technologies that withdraw less water, but consume markets could arise from the opposite direction – a shortfall of new projects – if the cuts in upstream spending in 2015-2016 are prolonged for another year. In 2015, the volume of conventional crude oil resources that received development approval fell to its lowest level since the 1950s and the data available for 2016 show no sign of a rebound. A lot of attention is focused on the remarkable resilience of US tight oil output through the current downturn and its potential ability, because of a Managing energy-water linkages is pivotal to the prospects for successful realisation of a range of development and climate goals. There are several connections between the new United Nations Sustainable Development Goals (SDG) on clean water and sanitation (SDG 6) and affordable and clean energy (SDG 7) that, if managed well, can help with the attainment of both sets of goals.

There are also many economically viable opportunities for energy and water savings that can relieve pressures on both systems, if considered in an integrated manner. Efforts to tackle climate change can exacerbate water stress in some cases, or be limited by water availability. Some low-carbon technologies, such as wind and solar PV, require very little water; but the more a decarbonisation pathway relies on biofuels, concentrating solar power, carbon capture or nuclear power, the more water it consumes. As a result, despite lower energy demand, water consumption in 2040 in the 450 Scenario is slightly higher than in our main scenario.

INDIA bets big on solar power, to double capacity by 2020

Indian Govt seeks to double power generation under solar parks scheme to 40,000 MW, proposes to extend Rs8,100 core in assistance to fund 30% of initial project cost

The government has recently announced an ambitious scheme to double solar power generation capacity under the solar parks scheme to 40,000 megawatts (MW) by fiscal 2020.

The centre proposes to extend Rs8, 100 crore in assistance to fund 30% of the initial project cost of developers. India had solar capacity of 9,012.69MW as of 31 December 2016...

The move, which comes in the backdrop of solar power tariffs hitting a record low of Rs2.97 per kilowatt-hour (kWh), is an important step in creating an ecosystem which will enable the scaling of solar power in the country to achieve the target of generating 100GW of solar power by 2022. This is because a solar park will provide the building blocks—land and grid connectivity—to set up big solar projects.
Fourth Industrial Revolution

We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society.

The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.

There are three reasons why today’s transformations represent not merely a prolongation of the Third Industrial Revolution but rather the arrival of a Fourth and distinct one: velocity, scope, and systems impact. The speed of current breakthroughs has no historical precedent. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. Moreover, it is disrupting almost every industry in every country. And the breadth and depth of these changes herald the transformation of entire systems of production, management, and governance.

The possibilities of billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge, are unlimited. And these possibilities will be multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing.

Already, artificial intelligence is all around us, from self-driving cars and drones to virtual assistants and software that translate or invest. Impressive progress has been made in AI in recent years, driven by exponential increases in computing power and by the availability of vast amounts of data, from software used to discover new drugs to algorithms used to predict our cultural interests. Digital fabrication technologies, meanwhile, are interacting with the biological world on a daily basis. Engineers, designers, and architects are combining computational design, additive manufacturing, materials engineering, and synthetic biology to pioneer a symbiosis between microorganisms, our bodies, the products we consume, and even the buildings we inhabit.
Challenges and opportunities

Like the revolutions that preceded it, the Fourth Industrial Revolution has the potential to raise global income levels and improve the quality of life for populations around the world. To date, those who have gained the most from it have been consumers able to afford and access the digital world; technology has made possible new products and services that increase the efficiency and pleasure of our personal lives. Ordering a cab, booking a flight, buying a product, making a payment, listening to music, watching a film, or playing a game—any of these can now be done remotely.

In the future, technological innovation will also lead to a supply-side miracle, with long-term gains in efficiency and productivity. Transportation and communication costs will drop, logistics and global supply chains will become more effective, and the cost of trade will diminish, all of which will open new markets and drive economic growth.

At the same time, as the economists Erik Brynjolfsson and Andrew McAfee have pointed out, the revolution could yield greater inequality, particularly in its potential to disrupt labour markets. As automation substitutes for labour across the entire economy, the net displacement of workers by machines might exacerbate the gap between returns to capital and returns to labour. On the other hand, it is also possible that the displacement of workers by technology will, in aggregate, result in a net increase in safe and rewarding jobs.

We cannot foresee at this point which scenario is likely to emerge, and history suggests that the outcome is likely to be some combination of the two. However, I am convinced of one thing—that in the future, talent, more than capital, will represent the critical factor of production. This will give rise to a job market increasingly segregated into “low-skill/low-pay” and “high-skill/high-pay” segments, which in turn will lead to an increase in social tensions.

In addition to being a key economic concern, inequality represents the greatest societal concern associated with the Fourth Industrial Revolution. The largest beneficiaries of innovation tend to be the providers of intellectual and physical capital—the innovators, shareholders, and investors—which explains the rising gap in wealth between those dependent on capital versus labour. Technology is therefore one of the main reasons why incomes have stagnated, or even decreased, for a majority of the population in high-income countries: the demand for highly skilled workers has increased while the demand for workers with less education and lower skills has decreased. The result is a job market with a strong demand at the high and low ends, but a hollowing out of the middle.

This helps explain why so many workers are disillusioned and fearful that their own real incomes and those of their children will continue to stagnate. It also helps explain why middle classes around the world are increasingly experiencing a pervasive sense of dissatisfaction and unfairness. A winner-takes-all economy that offers only limited access to the middle class is a recipe for democratic malaise and dereliction.

Discontent can also be fuelled by the pervasiveness of digital technologies and the dynamics of information sharing typified by social media. More than 30 percent of the global population now uses social media platforms to connect, learn, and share information. In an ideal world, these interactions would provide an opportunity for cross-cultural understanding and cohesion. However, they can also create and propagate unrealistic expectations as to what constitutes success for an individual or a group, as well as offer opportunities for extreme ideas and ideologies to spread.
The impact on business

An underlying theme in my conversations with global CEOs and senior business executives is that the acceleration of innovation and the velocity of disruption are hard to comprehend or anticipate and that these drivers constitute a source of constant surprise, even for the best connected and most well informed. Indeed, across all industries, there is clear evidence that the technologies that underpin the Fourth Industrial Revolution are having a major impact on businesses.

On the supply side, many industries are seeing the introduction of new technologies that create entirely new ways of serving existing needs and significantly disrupt existing industry value chains. Disruption is also flowing from agile, innovative competitors who, thanks to access to global digital platforms for research, development, marketing, sales, and distribution, can oust well-established incumbents faster than ever by improving the quality, speed, or price at which value is delivered.

Major shifts on the demand side are also occurring, as growing transparency, consumer engagement, and new patterns of consumer behaviour (increasingly built upon access to mobile networks and data) force companies to adapt the way they design, market, and deliver products and services.

A key trend is the development of technology-enabled platforms that combine both demand and supply to disrupt existing industry structures, such as those we see within the “sharing” or “on demand” economy. These technology platforms, rendered easy to use by the Smartphone, convene people, assets, and data—thus creating entirely new ways of consuming goods and services in the process. In addition, they lower the barriers for businesses and individuals to create wealth, altering the personal and professional environments of workers. These new platform businesses are rapidly multiplying into many new services, ranging from laundry to shopping, from chores to parking, from massages to travel.

On the whole, there are four main effects that the Fourth Industrial Revolution has on business—on customer expectations, on product enhancement, on collaborative innovation, and on organizational forms. Whether consumers or businesses, customers are increasingly at the epicentre of the economy, which is all about improving how customers are served. Physical products and services, moreover, can now be enhanced with digital capabilities that increase their value. New technologies make assets more durable and resilient, while data and analytics are transforming how they are maintained. A world of customer experiences, data-based services, and asset performance through analytics, meanwhile, requires new forms of collaboration, particularly given the speed at which innovation and disruption are taking place. And the emergence of global platforms and other new business models, finally, means that talent, culture, and organizational forms will have to be rethought.

Overall, the inexorable shift from simple digitization (the Third Industrial Revolution) to innovation based on combinations of technologies (the Fourth Industrial Revolution) is forcing companies to re-examine the way they do business. The bottom line, however, is the same: business leaders and senior executives need to understand their changing environment, challenge the assumptions of their operating teams, and relentlessly and continuously innovate.

The impact on government

As the physical, digital, and biological worlds continue to converge, new technologies and platforms will increasingly enable citizens to engage with governments, voice their opinions, coordinate their efforts, and even circumvent
the supervision of public authorities. Simultaneously, governments will gain new technological powers to increase their control over populations, based on pervasive surveillance systems and the ability to control digital infrastructure. On the whole, however, governments will increasingly face pressure to change their current approach to public engagement and policymaking, as their central role of conducting policy diminishes owing to new sources of competition and the redistribution and decentralization of power that new technologies make possible.

Ultimately, the ability of government systems and public authorities to adapt will determine their survival. If they prove capable of embracing a world of disruptive change, subjecting their structures to the levels of transparency and efficiency that will enable them to maintain their competitive edge, they will endure. If they cannot evolve, they will face increasing trouble.

This will be particularly true in the realm of regulation. Current systems of public policy and decision-making evolved alongside the Second Industrial Revolution, when decision-makers had time to study a specific issue and develop the necessary response or appropriate regulatory framework. The whole process was designed to be linear and mechanistic, following a strict “top down” approach.

But such an approach is no longer feasible. Given the Fourth Industrial Revolution’s rapid pace of change and broad impacts, legislators and regulators are being challenged to an unprecedented degree and for the most part are proving unable to cope.

How, then, can they preserve the interest of the consumers and the public at large while continuing to support innovation and technological development? By embracing “agile” governance, just as the private sector has increasingly adopted agile responses to software development and business operations more generally. This means regulators must continuously adapt to a new, fast-changing environment, reinventing themselves so they can truly understand what it is they are regulating. To do so, governments and regulatory agencies will need to collaborate closely with business and civil society.

The Fourth Industrial Revolution will also profoundly impact the nature of national and international security, affecting both the probability and the nature of conflict. The history of warfare and international security is the history of technological innovation, and today is no exception. Modern conflicts involving states are increasingly “hybrid” in nature, combining traditional battlefield techniques with elements previously associated with nonstarter actors. The distinction between war and peace, combatant and non-combatant, and even violence and nonviolence (think cyber warfare) is becoming uncomfortably blurry.

As this process takes place and new technologies such as autonomous or biological weapons become easier to use, individuals and small groups will increasingly join states in being capable of causing mass harm. This new vulnerability will lead to new fears. But at the same time, advances in technology will create the potential to reduce the scale or impact of violence, through the development of new modes of protection, for example, or greater precision in targeting.

The impact on people

The Fourth Industrial Revolution, finally, will change not only what we do but also who we are. It will affect our identity and all the issues associated with it: our sense of privacy, our notions of ownership, our consumption patterns, the time we devote to work and leisure, and how we develop our careers, cultivate our skills, meet people, and nurture relationships. It is already changing our health
and leading to a “quantified” self, and sooner than we think it may lead to human augmentation. The list is endless because it is bound only by our imagination.

I am a great enthusiast and early adopter of technology, but sometimes I wonder whether the inexorable integration of technology in our lives could diminish some of our quintessential human capacities, such as compassion and cooperation. Our relationship with our smartphones is a case in point. Constant connection may deprive us of one of life’s most important assets: the time to pause, reflect, and engage in meaningful conversation.

One of the greatest individual challenges posed by new information technologies is privacy. We instinctively understand why it is so essential, yet the tracking and sharing of information about us is a crucial part of the new connectivity. Debates about fundamental issues such as the impact on our inner lives of the loss of control over our data will only intensify in the years ahead. Similarly, the revolutions occurring in biotechnology and AI, which are redefining what it means to be human by pushing back the current thresholds of life span, health, cognition, and capabilities, will compel us to redefine our moral and ethical boundaries.

**Shaping the future**

Neither technology nor the disruption that comes with it is an exogenous force over which humans have no control. All of us are responsible for guiding its evolution, in the decisions we make on a daily basis as citizens, consumers, and investors. We should thus grasp the opportunity and power we have to shape the Fourth Industrial Revolution and direct it toward a future that reflects our common objectives and values.

To do this, however, we must develop a comprehensive and globally shared view of how technology is affecting our lives and reshaping our economic, social, cultural, and human environments. There has never been a time of greater promise, or one of greater potential peril. Today’s decision-makers, however, are too often trapped in traditional, linear thinking, or too absorbed by the multiple crises demanding their attention, to think strategically about the forces of disruption and innovation shaping our future.

In the end, it all comes down to people and values. We need to shape a future that works for all of us by putting people first and empowering them. In its most pessimistic, dehumanized form, the Fourth Industrial Revolution may indeed have the potential to “robotize” humanity and thus to deprive us of our heart and soul. But as a complement to the best parts of human nature—creativity, empathy, stewardship—it can also lift humanity into a new collective and moral consciousness based on a shared sense of destiny. It is incumbent on us all to make sure the latter prevails.

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*Source: World Economic Forum.*
Big Oil Panics Ahead of COP – 22

Exxon and Friends Panic in Marrakech

Last year, 195 countries across the globe made a landmark agreement.

The COP-21 meeting in Paris ended with a decision that *something* had to be done to slow climate change and reduce the world’s greenhouse gas emissions.

And the face of the energy markets changed forever...

Well, in theory anyway.

In practice, we haven’t heard much more than a mention here or there of the initiative, an acknowledgement that it exists, and some plans for future implementation. The problem is that the countries were left to decide what that *something* was, and so far they’ve been slow to act.

Monday begins the two-week process all over again. This year 2016, Nov-16 COP-22 in Marrakech will focus on measuring actual progress toward a cleaner climate.

As we begin phase two of this global energy development, let’s take a look at some of the changes that could be made within the next few years.

**Renewable Resurgence**

Obviously when talking clean energy production, renewables are at the top of the list.

Solar especially is seeing renewed interest as the best chance for major carbon reduction. Wind, and even nuclear power, is also being considered as a replacement for dirty coal.

The real sign of the times came just this week when a handful of the world’s biggest oil and gas companies came together to form a renewable energy powerhouse.

Oil majors Saudi Aramco, Shell, Total, BP, Eni S.p.A., Statoil, and Repsol are forming a joint fund to invest in the future of renewable energies.

Why would a group consisting of nearly 20% of the entire world’s oil market band together to support the energy craze that could wipe out their business?

Two reasons:

1. They’re smart enough to know that renewable energy is the future, one way or the other.
2. Renewable energy won’t actually wipe oil and gas out. It’ll just... alter the balance of power a bit.

What’s important to note here is that oil and gas aren’t always direct competitors with renewables. Oil, in fact, isn’t a major producer of household energy at all. The vast majority of it ends up as gasoline for cars!

And as for natural gas, it won’t be dying out anytime soon either. Renewables are growing fast — and this fund will do...
wonders for the slow but steady growth of solar and wind — but in the interim, natural gas is going to be taking over in large part for coal.

This fund is just an investment in the future these companies know is inevitable.

Fun fact: one of the first major companies to start investing in solar energy research, long before even the smallest panels were commercially viable, was ExxonMobil!

So really, the oil and gas industry has a long history of investing in clean energies.

Only now there are a few more reasons for these fossil fuel companies to start cleaning up the climate...

**Taxing the Gases**

Post-COP-21, the fantasy of a tax on carbon emissions became a distinct possibility. And instead of rallying against such a crime on good fossil fuel profits, many oil and gas companies supported it.

ExxonMobil, once again quick to see the writing on the wall, was the first in the industry to suggest a carbon tax way back in 2009.

I think there are a lot of reasons for this seemingly counterintuitive move, but the most obvious of them I’ve already mentioned: people are pushing for clean energy, and that push isn’t going to stop until it happens.

Oil and gas companies that come out in support of these things now are holding onto their market share by playing to public sentiment. It’s business, pure and simple.

What’s more, the agreement made in Paris reached an important milestone on Friday: upon the official inclusion of 55 countries accounting for more than half of the world’s carbon emissions, the accord was able to officially come into force.

This means that actual legislation will be taking over for proposals and plans. Legal regulations can now zero in on countries not meeting their goals and keep everyone on track.

There’s another big reason oil and gas companies would want to jump on the clean energy bandwagon: if they don’t, they’ll be the ones paying the most later on.

Oil and gas operations are inherently carbon-heavy. Refining, transportation, and even production itself can be dirty business. Natural gas especially gets a bad rap for the flaring that releases pressure on the equipment, but also puts more methane in the air.

If a legal tax on carbon emissions comes to pass, already battered oil companies may not live to see profits again. These are exactly the things the new fund will be looking to improve, in addition to funding new R&D in renewable technologies.

Things like carbon capture and energy-efficient production methods will be the way to success for oil and gas, and companies focusing on these things will offer investors the biggest benefits.
It may even go beyond Big Oil simply investing in renewables from the outside. For starters, Total has already become the world’s leading clean-conscious fossil fuel company. It holds stock in solar installer SunPower and energy storage provider Sunverge.

Just this year, it bought a battery maker called Saft to be its own personal foray into the lucrative world of energy storage. It may not be the norm for oil and gas to buy into technology like this yet, but I wouldn’t be surprised to see more companies following in Total’s footsteps after this year. Keep an eye out for more updates as COP-22 gets underway.

Source: Megan Dailey Energy and Capital

As solar shines, time to balance generation

The CEA, in its recent draft National Electricity Plan (NEP), projects thermal PLFs to be at 48% if capacity addition in renewables is 175 GW by 2022, and at 54% if it is 125 GW (which is the CEA’s bear case capacity addition). Such low PLF levels will not only have an impact on the commercial viability of projects, but also lead to inefficient thermal generation that affects sector viability and sustainability of environment. For instance, any reduction in PLFs beyond a threshold will lead to higher station heat rate, and consequently higher coal consumption and poor efficiency. Therefore, capacity addition in renewable energy needs to be synchronized with the ecosystem such that efficiency loss in thermal and the balancing cost is minimized.

In addition there is a limit to how much inconstant power a local grid can support, which can cause stability issues. A target of 175 GW translates to around 75% of India’s peak load requirement by fiscal 2022.

Absorbing such a high quantum of inconstant power will require access to a greater balancing area. While most of the capacity addition in renewables has taken place on a state-level basis, there is a need to encourage interstate transactions for such energy. For example, Jharkhand, which invited solar bids for 1,200 MW as against its local peak demand of close to 2,000 MW, will most likely face challenges in efficiently managing grid issues in the near term. This will require successful implementation of the availability-based tariff mechanism, good forecasting capacities, scheduling framework at the state level, and implementation of electronic metering infrastructure. The direct impact of renewable energy is that associated transmission charges fall on thermal counterparts, while the indirect impact will be because of reduced utilization of transmission capacity owing to the lower PLF of thermal projects.

So while falling solar tariffs augur well, the sustainability of an aggressive capacity-addition target of 125 GW for renewable energy will depend on balancing cost, efficiency of thermal generation, grid management, and investments in hydro- and gas-based power to meet peak demand.

Source: Vivek Sharma, Director—energy & natural resources, Crisil Infrastructure Advisory
Indian Oil & Gas: The Mega Merger

The proposal to merge state-owned oil & gas companies to create a single, unified giant has raised many eyebrows, and hackles.

Small may still be beautiful, but larger the better’ is a more apt motto for modern business organisations. Size matters; particularly in the oil and gas industry where capital investments tend to be huge, and the risks, even higher. In contemporary times, technology giants are increasingly displacing traditional companies from the Fortune 500 lists. But oil is right at the top of the heap. And yet, the recent move by the Indian government to merge state-owned oil and gas companies to create a unified behemoth has triggered responses that range from surprise to disbelief to scepticism. Of course, there were some who have welcomed the move as a timely, wise and strategic.

While delivering his fourth budget speech on 1 February, finance minister Arun Jaitley declared: “The government plans to form a major oil company by merging some of the existing firms in the oil and gas sector to take on international and domestic players... Possibilities of such restructuring are visible in the oil & gas sector now and we propose to create an integrated public sector oil major that will be able to match the performance of international and domestic private sector oil and gas companies. (It will give them the) capacity to bear higher risks, avail economies of scale, take higher investment decisions and create more value for the stakeholders. India has 18 state-owned oil and gas companies at present. The top six include large exploration and production players namely Oil and Natural Gas Corporation (ONGC), Oil India, and refining and marketing companies namely Indian Oil Corporation (IOC), Bharat Petroleum Corporation (BPCL) and Hindustan Petroleum Corporation (HPCL), besides the Gas giant GAIL.

The Unified Giant

Exactly how big will be a unified giant and how will it stack up against global oil majors? The eight largest state-owned enterprises in the sector are Indian Oil, ONGC, BPCL, HPCL, GAIL, Oil India, Gujarat State Petroleum Corporation (GSPC) and Mangalore Refinery and Petrochemicals (MRPL). The revenue from other entities will not substantively change the numbers. If these entities are merged, the total revenue of the unified giant will be about $140 billion. It would become the 11th largest oil and gas company in the world, though still far behind behemoths like Saudi Arabia-based Aramco ($460 billion) and China-based Sinopec ($440 billion). Some think that the unified entity will have greater room to negotiate and maneuver and will reap benefits from economies of scale.

Says Nikunj Dhanuka, Managing Director and CEO of IG Petrochemicals, “The petroleum sector in particular was in the forefront of action, with the stage being set for the Indian state-owned petroleum companies to be merged into one big national petroleum company with economies of scale and the ability to leverage an integrated portfolio of offerings in the international competitive marketplace. This will set the stage for building a national petroleum resource entity, capable of leveraging some of the best deals and cost advantages given the negotiating power that it would have. In doing so, the country should have its own version of PETRONAS or Royal Dutch Shell or BP, which is capable of being competitive in the international
space as well as meeting with the ever-growing demand of the domestic market in the next one year, with a totally integrated end-to-end portfolio of products.

This enthusiasm was, however, missing among other senior professionals, industry experts and consultants that BW Business world contacted. One of the very few to respond on record was B. Ashok, chairman of Indian Oil, the largest company in India in terms of revenues. He says, “The oil and gas companies in the public sector are robust and have their own unique strengths. In my opinion, the mergers could be done in phases, after a careful and professional mix and match process.” According to him, the public sector enterprises operating in the oil sector have multiple stakeholders, and the aspirations and expectations of each of these stakeholder groups have to be taken into consideration while going forward with a plan. “The immediate challenge will be to overcome the cultural differences among the enterprises and to create a buy-in among various stakeholders with a conviction that any merger would be a win-win proposition. Also, there can be different models of achieving integration and we should carefully evaluate the pros and cons of each of these models and arrive at a consensus that benefits all, and at the same time addresses India’s current and future energy needs, “he adds.

Even as the Budget speech of Jaitley has led to many comments, there is still no clarity on what exactly will be done next. Several people in the government, industry, investors and the analyst community, with whom BW Business world spoke, said that it may be yet another non-starter as was the case twice in the past when similar proposals were mooted by two previous governments. While the government is claiming that it would be able to complete the process, starting from the concept paper to the ground work, in the current fiscal year, a leading global consultant with a key portfolio of oil sector practice confirms that it will take much longer. One day after Jaitley delivered his Budget speech, oil minister Dharmendra Pradhan said in a media interview that the government was looking at the option of creating multiple integrated state oil companies, not just one large firm. “It’s not going to be a merger of all oil public sector undertakings into one,” said Pradhan, adding that “It’s an in-principle decision taken by the government to develop a few integrated state oil companies, which will have better risk management capacity and the clout to compete in international markets.”

As expected, most of the oil and gas units that are supposed to be participating in this reformatory move, reserved their comments when asked to share their views for this story.

History appears to be repeating itself. The country has seen it at least twice in the last two decades, when two previous governments explored similar options. The last attempt was about 12 years ago. It was Mani Shankar iyer, the then petroleum minister in the first Manmohan Singh government, who formed a committee to look into such an option in 2004. The committee, under former steel secretary V. Krishnamurthy, was constituted to recommend an appropriate structure for state-owned oil and gas companies. The mandate was to look at the possibility of creating a larger entity with a very strong balance sheet to raise huge capital from international markets for acquiring energy reserves and assets abroad.

The committee, which included former petroleum secretaries, Vijay Kelkar and G. V. Ramakrishna, former chairman of ONGC B. C. Bora, the former chief of Bharat Petroleum U. Sundararajan and the former finance secretary G. K. Arora, however did not favour the merger plan. Says former minister Aiyar, “I was in favour
of the proposal then as circumstances were different. The scenario has changed completely since then and I don’t think it makes any sense now”.

A similar proposal was made in 1994-95. The petroleum ministry in the P. V. Narasimha Rao government, which is credited for economic liberalisation of India, also looked into oil PSU merger option. Captain Satish Sharma, the then petroleum minister, too formed a reforms committee led by then oil and gas secretary Kelkar, and Bharat Petroleum’s Sundararajan.

Both committees had similar views. They were critical about an overall merger and rejected the idea of forming an oil monolith, saying it will not only create market monopoly but also affect the efficiency created by individual companies. Instead the committees suggested strengthening the structure of the state-owned oil companies through policy measures and improvements in management to focus on their core competencies.

While their views against merger of oil companies were also based on many other economic and political factors, including bad mergers and acquisitions in the global oil industry, another major objection was the strong resistance from heads of the oil companies.

According to a leading industry consultant who worked closely with the Krishnamurthy committee, the last merger plan was dropped because the heads of individual oil PSUs trashed it as non strategic. And, it was the people factor, including the job cuts and difficulties in managing hierarchies in the event of a mega merger, which fumed the resistance.

Undoubtedly, the current proposal demonstrates the government’s well-intended vision of creating a globally competitive energy behemoth. But considering the changing global industry scenario, where India is emerging as one of the most attractive retail markets for its private players as well as foreign oil giants, a decision in haste could turn the move counterproductive.

Plus, what could potentially block the entire project is the political dilemma on critical issues such as job cuts, hierarchies, and interest of minority shareholders, among others.

Although more clarity on the model and objectives are yet to emerge from the government, the proposal in its current form hasn’t gone down well with the critical stakeholders from the industry. Industry insiders and sector experts, including analysts and consultants, appear seriously skeptical of the overall concept. They say that what would rather make sense is a structural reformation by integrating upstream and downstream players separately. Any other model will certainly prove to be a serious policy blunder, they say.

“The issue to merge would necessarily need to be debated and addressed in the context of India’s diverse energy needs and global energy outlook. Securing desired levels of energy security, integrated investment planning, cost efficiency, deeper integration with global energy markets and human capital are critical aspects that need to be addressed upfront,” says Ajay Arora, partner and national leader (Oil & Gas), EY India.

According to Arora, India can evaluate the merits of consolidation on segment-wise basis such as upstream, downstream and separately for gas. Such consolidation gives the benefit of balance sheet size and focus, resulting in lower costs of capital and ability to execute large domestic and global projects. Hence, giving the Indian oil PSUs the size and scale to compete
with global oil and gas majors. The benefits of such an integration/merger are imminent. However, the merger needs to be planned meticulously in view of deal complexities, timelines and related human capital issues.

M&A Upsets:

As a matter of fact, the key rationale behind mergers and acquisitions in any sector is achieving operational synergies and optimising cost efficiency in a competitive industry environment. This would essentially mean resource optimisation, pruning extra capacities and overheads, including jobs, eliminating duplications and increasing efficiencies with the aim to boost profitability.

But in a country like India, where jobs remain a sentimental issue both in the political and social perspective, public sector organisations can’t even imagine such a sudden move. In addition, Indian public sector companies have heavy hierarchical clouts as well as a strong union culture, which will make integration and job cuts almost impossible to get through.

Besides, the committees tasked with exploring the feasibility and success of such an experiment also didn’t find enough empirical evidence that mergers and acquisition strategies were successful in majority cases.

Global data on mergers and acquisition across sectors show more than 70 per cent of them did not bring expected results or rather failed to give higher returns for shareholders in those organisations. And, the major causes of failure were directly related to unsuccessful integration process and people issues.

“Integrating India’s oil and gas PSUs across different operating areas in the value chain, mainly the upstream (exploration and production) and downstream (refining and marketing), will only upset the applecart,” says a leading sector expert with a global consultancy firm, who doesn’t want to be identified.

According to two industry analysts, some of the merger cases in the Indian public sector undertakings have proved big failures as the concerned decisions were taken in haste and without much clarity on the integration processes.

For instance, the Air India-Indian Airlines merger has by now become a classic case of the worst merger decision of the UPA government. Air India’s performance has worsened, and losses have widened, compared to efficiency and growth of its private sector rivals over the period. Jitender Bhargava, a former executive director of Air India who has written a damning book named “The Descent of Air India” said in a newspaper interview, “Whether it was the aircraft acquisition, merger (with Indian Airlines) or many other big expenditure decisions which harmed Air India financially were taken without proper thought or detailed discussions within the airline. A handful of Air India officials did lend support for questionable reasons. What also surprised me was though we had (banker) N. Vaghul on the board as an independent director, he did not red flag any of the decisions which had a huge financial bearing and led to eventual crippling of Air India.”

Another example is Coal India, which was created as a single entity that virtually controlled all the coal reserves of India. Though the company performance has improved recently, it has consistently been a poor performer and responsible for recurring and crippling shortages of coal in the country. So the
question is what if a corrupt minister and the ruling party in the future use a unified oil giant as a milch cow? It has happened in the past and there is no saying it will not happen again in future.

For example, two of ONGC’s decisions in the past have led to considerable controversies. In 2008-09, the company had worked out close to $2 billion to buy out Imperial Energy, which was exploring primarily in Russia. It has been eight years since the investment, and ONGC is yet to find much success in discovering oil or gas. Many allegations were levelled against the then UPA government for gold plating. More recently, ONGC decided to take over the KG basin gas blocks controlled by GSPC for about $1.2 billion. And this time, Congress leaders accused the NDA government of indulging in an alleged “scam” to save debt-ridden and loss-making GSPC. That’s not it, about 15 years ago, ONGC had acquired the stake controlled by the Aditya Birla Group in refining company MRPL. It is baffling why a crude-oil major took over a refining company instead of state-owned refining giants like Indian Oil. It is the possibility of arbitrary decisions like this that makes analysts even more sceptical.

Perhaps that is why, a key decision maker like finance secretary Ashok Lavas a was guarded while talking to BW Business world on the issue of creating a merged entity. He says, “Different businesses at different points in time, in different contexts, will have a different argument. Whenever the details are worked out, we will have to keep all these aspects in view, and do what is in the best interest of the sector, the best interest of the shareholders, and the best interest of the consumers...This is something which is in the works. It would be little premature for me to spell out the details. But different aspects have to be kept in view before a final view is taken on this.”

Global Scenario:

At the same time, it is a fact that mergers and acquisitions have been the norm in the global oil industry, and most of the global oil giants, including Exxon Mobil, ConocoPhillips, Royal Dutch Shell, BP, Gazprom, Rosneft, and Sinopec, China Petroleum are all results of mergers. Also, most of these oil giants, except a few big ones in the US and Europe, are currently state owned.

However, no country in the world except Venezuela has just one national oil company controlling the entire industry and market. Although China and Russia moved towards creating a consolidated oil and gas giant in the 1990s, they gradually backtracked and both countries have at least half a dozen large oil and gas companies.

Even as the Venezuela experiment of a single state-owned entity was launched by the late Hugo Chavez who wanted to create a ‘socialist paradise’, the experiment has been a costly failure as the state monopoly has actually started seeing a drop in production.

It is also interesting to note that the reason why countries have not created a single entity is efficiency. Empirical evidence shows that one behemoth as a monopoly always becomes inefficient over a period of time and leads to poor productivity. Even within the state sector, competition between companies is universally considered to be better, say industry experts.

The NDA government’s rationale behind the proposal to combine some or all of the state-owned oil and gas companies into one major entity i that it would give them the wherewithal to bid for major exploration and production assets in India and overseas.
It is also interesting to note that the latest proposal of consolidation and merger of the oil PSUs came just two years after another expert committee’s recommendations for greater accountability and autonomy for India’s national oil firms.

This committee, again headed by Vijay Kelkar, was mandated with drafting a broader proposal to reduce India’s oil imports by 2020. In 2014, the committee said strengthening the oil PSUs with greater accountability and autonomy is the need of the hour. But it is not very clear if the latest move could be considered a continuation of the same with a greater impetus on the financial bandwidth and strong balance sheet.

Since India is keen to acquire oil assets in international regions for energy security, it certainly needs to have globally competitive oil entities to compete with foreign giants.

In addition, these public sector companies also compete with comparatively more efficient private players such as Reliance Industries, Cairn India and Essar Oil in the domestic market. If the mega merger takes place, the new integrated player would be able to compete with global players such as the BP and Rosneft and Shell among others.

According to a recent S&P Platts report, India with its ever rising oil demand is attracting a lot of multinational firms to set up shop here. Simultaneously, the government is also stepping up efforts to ensure that state-run oil companies are on equal footing to compete, not just with domestic private players but also with global oil firms.

In 2016, India’s oil products’ demand rose by a robust 8.8 per cent year-on-year to 192.80 million mt, or 4.14 million b/d, according to data from the Petroleum Planning and Analysis Cell.

Platts Analytics predicts that India’s oil demand growth will outpace China’s for the third year in a row in 2017. It estimates that Indian oil demand is expected to grow at about 7 per cent to 4.13 million b/d and China’s by only about 3 per cent to 11.5 million b/d.

The government’s decision to build emergency storage sites in underground caverns in the country to hedge against energy security risks also makes lot of sense. In his Budget speech, finance minister also said that two new planned reserve facilities along with the existing three reserves will take up the country’s strategic reserve capacity to 15.33 million metric tonnes.

India currently meets more than 80 per cent of its energy requirements through imports. So the government has now set a goal of reducing this import dependence to 67 per cent by 2020.

How Prepared Is India?

As stated earlier, it isn’t the first time a mega merger plan in the country’s oil sector has come up for discussion. And as it happened in 2005, the discussion on proposed monolith structure for oil sector hasn’t found much favour within the industry even today. The advisory committees had earlier stated that any merger in the Indian context which would result in massive job cuts might not be feasible.

“Not much seems to have changed since then. We believe that the implementation of such a merger remains a concern, specifically getting the minority shareholders on board,” says an industry consultant.

The analyst community is also equally worried about the impacts of such a merger.
A Fitch Ratings note, immediately after India’s Budget announcement on the proposed oil PSUs merger, said, “Although the proposed merger of state-owned oil companies could reduce inefficiencies across the sector and create an entity better placed to compete globally for resources, it would face significant execution challenges, particularly in terms of managing the integration of employees, addressing overcapacity in the merged entity, and winning the backing for the merger from private shareholders.”

“A merged entity would have opportunities to save on costs and improve operational efficiency as there would be less need for multiple retail outlets in a single area,” the Fitch note said, adding that it would also reduce transportation costs as the retailers can source from the nearest refinery, rather than the ones they own — as is currently the common practice. A merged entity would also be able to share expertise for exploration and acquisition of resources, it added.

“But, how will the state handle the likely decline in competition after a merger,” the Fitch note asked the most critical question.

“DEFINITIVE ROADMAP ON OIL PSUs’ MERGER VERY SOON”

Many countries across the world are breaking oil behemoths into smaller entities. We, on the other hand, are talking of creating a behemoth. What’s the rationale? Whenever you look at these businesses with a number of components that are handled by different utilities, there’s always a question of deriving the maximum advantage. Either with vertical integration or sometimes by dismantling an integrated entity. One has to look at the business cycle and the time when you can reap an advantage. All these things would be

Taken into consideration by the government before a final decision is taken.

What does it mean by one big entity or two three entities having presence in the entire value chain?

This is something that is in the works. It would be little premature for me to spell out the details. But different aspects have to be kept in mind before a final view is taken on this.

Globally major corporations are being demerged into smaller entities. Are we walking another trajectory?

Look at the power sector. At one point in time, we went through a process of unbundling because it was felt that the production, the delivery, the retailing should not be bundled into one utility.

Different businesses at different points in time, in different contexts, will have a different argument. Whenever the details are worked out, we will have to keep all these aspects in view, and do what is in the best interest of the sector, the best interest of the shareholders, and the best interests of the consumers.

By when will we see a definitive roadmap?

I think very soon uttered

Source: Business World.

Author: Suman K. Jha.
ACs to get cheaper as govt launches new project

A 1.5 tonne, 5-star rated split AC that now costs Rs 40,000 could cost less than Rs 30,000 by 2018

Want to buy an air conditioner (AC) that does not come with a three-digit electricity bill, but can’t afford one? You may have to wait for just a few more months, as prices of highly energy-efficient ACs are expected to come down significantly very soon.

The union government is finally launching a scheme that can radically bring down prices of energy-efficient ACs. The power ministry has been contemplating such a project for quite some time now (Business Standard first reported about it in 2015).

The ministry has now decided to roll it out through one of its arms – Energy Efficiency Services Ltd (EESL) – a joint venture firm formed by various state-run power companies.

Once operational, the project may bring down prices of highly energy efficient ACs by 30 per cent in the near term. A 1.5-tonne, 5-star rated split AC that now costs some Rs 40,000 could be available for less than Rs 30,000 by 2018. But that’s not all. Apart from lower upfront price, these ACs may reduce your monthly electricity bills by 20-45 per cent depending on usage. So, the cost of ownership of an AC may decrease by 30 to 60 per cent, industry experts said.

Under the scheme, EESL will make bulk procurement of highly energy-efficient ACs from manufacturers like Blue Star, Voltas, Daikin and Whirlpool, among others. It will offer them to consumers under zero down payment schemes where one would have to pay only equated monthly instalments (EMI) which, the government expects could further encourage consumers to opt energy efficient products.

Major AC manufacturers in the country had been lobbying to the government for bringing down taxes on more energy efficient ACs (like five star or above and inverter ACs), lower tax rate under the upcoming goods and services tax (GST) and incentivizing buys through subsidy. However, the recent trigger came from the power ministry as minister Piyush Goyal himself took interest in it. The minister is keen to roll out a scheme that increases sales of AC in the country which will eventually bring down the cost of manufacturing, sources said.

Currently, the AC market in India is pegged at four million units a year, of which only six per cent are inverter fitted (which are more energy efficient than a 5-star AC) and 17 per cent are 5-star ACs. During the past four years, the AC market in India has grown at about five per cent per year, from 3.5 million in 2013 to 4.1 million units in 2016.

However, if implemented properly the scheme has the potential to boost sales. According to Pradeep Bakshi, president and chief operating officer, Voltas, the market is expected to grow by over 10 per cent in the coming years. This could increase the size of the market to 7 million units (per year) by 2020.
Energy efficient AC market in India remains very small as penetration of ACs is still at three per cent of the total households in the country – lowest among all large consumer durable items. While in China, out of the total 10 million ACs sold every year, over 55 per cent are inverter ACs, in Australia and Japan the figures are 85 per cent and 100 per cent respectively.

To encourage buyers to go for higher energy efficient ACs, manufacturers have also asked the government to bring down the tax rate under GST for ACs which otherwise is expected to be at 28 per cent.

During the initial phase, EESL has decided to procure 2,00,000 ACs from companies and sell them to institutional buyers like Banks (for office usage and ATM counters) and big corporate buyers. EESL has been given the task to implement the scheme keeping an eye on its successful implementation of a similar scheme on LED bulbs. Earlier, the firm had initiated a bulk buying and marketing scheme for LEDs which eventually brought down prices by 80 per cent.

According to B. Thaiagranjan, whole time director, Blue Star, the extent of decrease in prices would depend on the quantity of ACs that the agency manages to procure and sell during the initial phase. Higher the number of units sold, higher the cost benefits are.

Source: Business Standard, 13th January- ACs to get cheaper as govt launches new project.

India has crossed 44 GW of RE capacity

The cumulative installed capacity of renewable energy has crossed 44 GigaWatts and “phenomenal progress” has been made in other key infrastructure sectors like aviation and railways, a meeting chaired by Prime Minister Narendra Modi was told on Monday. At the meeting held to review the functioning of the key infrastructure sectors, NITI Aayog made a presentation, according to a PMO statement.

The meeting was told that in the new and renewable energy sector, the cumulative installed capacity has crossed 44 GigaWatts, it said. Targets have been met for various components, and various projects under Centre and state policies, the statement said. The Prime Minister was briefed on plans and strategies to further ramp up solar energy production, including through rooftop generation.

The meeting was also told that 3.5 crore LED bulbs have been distributed during the first quarter of the current financial year. In the aviation sector, Modi reviewed progress made in key policy areas such as safety and connectivity. It was noted that eight Indian airports are ranked among the top 5 globally in their respective categories, the statement said.

Source: Windpro
EESL to invest Rs 24,700 crore for energy conservation in Andhra Pradesh

Energy Efficiency Services Limited (EESL), a company under the Ministry of Power, has signed multiple MoUs with the government of Andhra Pradesh entailing the investment of Rs 24,700 crore for energy efficiency and solar projects in the state.

The execution of the projects will help the state reduce consumption of power and add over 80,000 jobs in the state.

Through a memorandum of understanding signed at the Partnership Summit here on Saturday, the EESL will distribute energy-efficient domestic appliances like LED bulbs and tube lights and 5-star rated fans under the ‘Unnat Jeevan by Affordable LEDs and Appliances for All (UJALA) scheme.

Andhra Pradesh was the first state to execute the UJALA programme for LED bulbs in 2015. The EESL will continue to execute the programme in the state for three years, the company said in a statement.

The EESL will also install a 50,000 Solar Photo-Voltaic (PV) grid connected to agricultural pump sets in each DISCOM area.

It is acknowledged that irrigation needs are intermittent, between 200 to 250 days in a year, leaving most of the days with additional power available. Solar PV grid-connected pump sets will bridge the gap and the surplus power may be fed back to the grid.

Several other projects will be executed by the EESL for the state government, including conversion of 500 government-owned buildings into energy-efficient buildings over three years.

Installation and maintenance of energy efficient LED street lights in 1000 gram panchayats over 10 years; and replacement of over 10 lakh inefficient agricultural pump sets with energy efficient ones in three years.

Source: Energy World, 29th January 2017- EESL to invest Rs 24,700 crore for energy conservation in Andhra Pradesh
How to Improve Energy Efficiency of Buildings in India

Introduction:
Rajan is the Executive Director, Centre for Advanced Research in Building Science and Energy (CARBSE) and he is a faculty at CEPT University in Ahmedabad. He is one of the most respected building energy efficiency experts in India. Rajan’s Bio is available on his faculty profile page at CEPT University.

Why do you think Building Energy Efficiency research is important in the Indian context?
We need to reduce our impact on the environment and we have not invested enough in buildings in the past. The kind of knowledge that is needed for building energy efficiency. We will be constructing a lot of buildings in the future.

What got you interested in the field of building energy efficiency?
Rajan is an Architect, and he was a practising architect. He started working in the building EE space during the course of his profession.

What is the mission of CARBSE within the Indian Building EE space?
The mission of CARBSE is to provide solutions for constructing and operating buildings in an energy efficient manner. Focus is on human habitat (buildings, neighborhoods and cities). CARBSE has two pronged agenda: Any research that is not a high priority for India will not be carried out. Secondly, CARBSE will not conduct any research methodology that will get questioned in international arena.

Implications of the research ranges from creating a material database or thermal comfort model or energy models for Indian context. This has resulted in realization that we need four things: a. materials database, b. a thermal comfort model that is contextual to India, c. Weather information which is robust, and d. Calibrated simulation models.

The use of building material has changed and the implications of these materials (e.g. glass) are becoming evident now. Secondly, the climatic conditions in the future will be different than they are today, what is the type of research that Carbse is into?

Any model required a certain amount of base data (similar to pathological data that doctors use). This in building context requires testing of materials, e.g. traditional materials like bricks, stone, bud blocks, etc. Then there are highly industrialized materials like paint, glass, thermal insulation, etc.

What are some of the challenges related to building EE at present?
There are multiple stakeholders: Government, private sector. It is a challenge to bring all of them to a common level of understanding when it comes to benefits of building energy efficiency. People are aware but may not have the required level of
understanding. The How is as important as the what. And that is where multiple stakeholders are struggling.

Let’s talk about Government policies and incentives: Smart cities, Housing for All, ECBC, Solar Rooftop target as part of National Solar Mission; what is the role of energy efficiency in these government schemes?

The initiatives and policies address energy efficiency in various way, but policy alone is not enough. Policy needs to be enforced by Law or it needs to be practices by the market. That is where we are struggling.

How do you think technology will influence the building design, construction and maintenance in the coming years? E.g. Internet of Things, Smart and Remote monitoring, Big Data Analytics, etc.

Technology is useful, but relying more and more on technology is not prudent. “Technology fix” will not give us the type of returns if we do not fix the basics. Example constructing the building and then relying on someone to make it energy efficient is not the right approach.

CARBSE has many first to its credit state of the art materials testing lab, a net zero energy building facility, a highly impactful adaptive thermal comfort empirical research work that is being used redefine the comfort standard in India? What gives you the maximum satisfaction and what’s next for Prof. Rajang Rawal and for CARBSE?

CARBSE has established itself but now is the time to take the work forward- to take the research on ground, how to change the design and construction practices. Being a University, CARBSE believes that we need to have capable persons to take the agenda forward. Short term capacity building programs are not enough. There needs to be a cadre of people who undergo rigorous training for say a couple of years and have field experience.

Do you think there is scope for partnering with organizations to take the research in building EE forward?

We believe that there needs to be more and more research in building Energy efficiency, they need to understand working with industry, government, etc. Different institutes could work on building materials, use of technology, operations and maintenance, etc.

How can listeners get in touch with you?

CARBSE website is www.carbse.org. Rajan’s email address is rajanrawal@cept.ac.in

(Source: www.aeee.in)
Engaging Financial Community for Energy Efficiency

Introduction:

Steve Fawkes has 30+ years’ experience in Energy Efficiency and he is a recognized international expert in this field. He has delivered energy management programs for large public and private sector clients and developed innovative energy services for Enron and RWE. He was the Head of Clean-tech for Matrix and has Co-founded two ESCOs. He was Previously Non-Executive Director of listed smart meter provider, and he has provided policy advice to several governments, and he has published three books, 250+ papers & articles and writes an influential energy efficiency blog. He is a Senior Adviser to Investor Confidence Project, member of the Investment Committee of the London Energy Efficiency Fund, Trustee of the National Energy Foundation, and Member of High Level Advisory Board of the Centre for Industrial Sustainability, University of Cambridge Member of Steering Board of the Centre on Innovation and Energy Demand and the Sussex Energy Group, University of Sussex.

Steve, what got you interested in Energy Efficiency?

As a child, Steve visited a Hydro Electric project in Wales. In the early 1970s, the coal miners’ strike and the oil crisis and the resulting experience with power cuts and energy crisis made him realized the importance of energy efficiency. According to Steve, “In today’s world we are competing for limited resources. Most forms of energy have environmental impact, both globally and locally. Energy Efficiency can help in mitigating these impact, and also address issues such as energy security and energy supply.”

What is ICP and what does it aim to achieve?

A. Investor Confidence Project was started by Environmental Defense Fund in the US and it aims to make EE more investment friendly. There are many barriers to investing in EE, lack of standardization in the way EE projects are developed and documented is one of them. This has several negative effects. The transaction and due diligence cost is higher, the real risks and the perceived risks are also higher. To overcome some of these challenges, the ICP has developed a set of protocols for buildings that guides people from financial sector and building professionals to collaborate and develop documentation in a standard way. There is an accreditation program called Investor Ready Energy Efficiency, which means that a project developed as per the defined protocols can be ready for EE. An investor knows that a project developed using this protocol is ready for investment. ICP may expand its scope to industrial and infrastructure projects.

What are the similarities and the differences in the way building managers and investors view building energy efficiency?

Investors look for certainty of outcome, and how they will recover the investment. The projected savings are questioned, including say the payback period. Every project carries risk, and energy efficiency projects carry lower risk
compared to many projects, but this needs to be highlighted. The proposed savings need to be delivered. Factors such as change in energy prices also need to be factored in. Measurement and verification of the building performance also has to be considered.

Q. The market for Energy Efficiency in India is very small, compared to North America or Europe. But it is expected to grow in the coming years. What is the relevance of projects such as ICP in India?

A. ICP’s approach can be applied to both internal and external projects. CFOs of companies are investors in internally funded project, for example. As the ESCO and financial markets grow in India, standardization of process early on will give confidence to the investors. This will help in scaling the projects. Financing and refactoring (through Green Bonds or secondary financial markets) will also become easier. ICP could be useful tool for that.

In Indian capital markets, the interest rates are very high, and the end customer’s outlook a payback between 3 and 4 years. How do you think these factors influence the market for EE in India?

Even in low interest situations, most investors look at rapid returns. The underlying project economics are not very different, but the higher financing cost will be the factor that needs to be looked into.

What is ICP’s approach towards creating insurance products?

Insurance is a critical piece of the jigsaw puzzle. WE and Europe have seen interest by insurance and reinsurance companies for project performance. Their products are available, that is the good news, but projects such as ICP help in creating a database of performance. The insurance markets need the actuarial data for assessing the risk. Over a period of time, more and more insurance products will help in the growth of the market. Project performance will help in the insurance sector working in this space. Once this happens, the market will develop like any other part of the financial market.

Is this an area where you think Measurement and Verification will have a big rule to play?

IPVMP has done a lot of work in this space. M & V in various forms is built into the ICP as an absolutely essential element. Advent of technology and smart meters will only help in the growth. Inspire of this, M & V is a hard sell because we compare savings against the cost of doing nothing. The end users and investment community will both benefit because of this.

Business, policymakers and investors in India are upbeat about M & V. But where does it work and what are the limitations of M & V?

M & V works well in large scale projects. But in smaller projects such as residential, M & V is very difficult, because of variation in usage, human factors. That is where statistical tools help. There is some work being done in California in the residential space. For energy performance contracts, such as for a large hospital projects, the understanding between the ESCO and the client or the host is very important.
In the recently concluded 750 MW Rewa Solar Park auction in Madhya Pradesh, bids reached a new record low of Rs.3.30 (~$0.494)/kWh (levelized tariff over 25 years) over a rupee lower than the previous low tariff of Rs.4.34 (~$0.065)/kWh, which was recorded in the state of Rajasthan in January 2016. The winning bid for first year tariff hit a new low of Rs.2.97 (~$0.044)/kWh and will escalate by Rs.0.05 (~$0.0007) over 15 years, bringing the levelized tariff to Rs.3.30 (~$0.049)/kWh over 25 years.

In an extremely competitive auction, bids submitted were 10x the tendered volume at 7,500 MW for a tendered capacity of 750 MW. Last year the state government of Madhya Pradesh approved extending a payment guarantee for the Rewa Solar Park. The guarantee will ensure against any payment default to projects inside the solar park, stated an MPUVNL official. The official also added that the solar park is a joint venture of Solar Energy Corporation of India (SECI) and Madhya Pradesh Urja Vikas Nigan (MPUVNL). The payment guarantee and deemed generation benefit were contributing factors in attracting these low bids. The implementing agency (MPUVNL) did not put an upper limit capacity for bidders - any bidder was able to bid for the entire capacity (750 MW).

ACME Solar won with the lowest bid to develop a 250 MW project (Unit-2) quoting a tariff of Rs.2.970 (~$0.0444)/kWh for the first year and a levelized tariff over 25 years of Rs.3.30 (~$0.0494)/kWh, followed by Solenergi which won a 250 MW project (Unit-3) quoting a first year tariff of Rs.2.974 (~$0.0444)/kWh at a levelized tariff of Rs.3.304 (~$0.0495)/kWh. Mahindra Renewables was the other winner for a 250 MW project (Unit-1) with a first year tariff of Rs.2.979 (~$0.0445)/kWh and a 25 year levelized tariff of Rs.3.309 (~$0.0495)/kWh.

“ACME is really proud to participate in the Indian government’s continued effort to make renewable energy more bankable and attractive for both financial investors and Indian utilities. Given the strong framework and infrastructure readiness for this project, thus eliminating construction risk and counterparty risk for lenders, there is already interest from the lender community,” commented Mr. Manoj Kumar Upadhayay, Founder & Chairman, ACME Group.

“The REWA project is an excellent example of a win-win which can be achieved by proactive measures from the government and increased awareness of investor and lender requirements. Excellent work was done by project advisors and government in devising notable features like
sovereign guarantee, running a very structured process, top rated off-taker “take or pay” and state of readiness of the solar park. That coupled with our great experience with the MP government and utility because of our existing plant in the state (25 MW) gives us tremendous confidence to expand our 1.5 GW portfolio with this asset win. We are sure this will be a great addition to our portfolio and we look forward to execute,” continued Kumar.

Sembcorp Green Infra, SBG Cleantech, Hero Future Energies, Enel Green Power, Solairedirect, ReNew Power, Azure Power, Adani, and Canadian Solar were some of the other developers who participated in the auction.

“We saw record low bids largely because of our progress made on the solar park infrastructure, unlike other solar parks where projects were tendered during initial stages of park development. We in Madhya Pradesh waited to create conducive infrastructure, and the results are here for everyone to see,” said an official at MPUVNL.

Another official at MPUVNL believes that this low tariff is feasible. “The low tariff is not a surprise as these projects are viable for developers at these costs. If you factor that all of these projects are in the same location, developers have eliminated a lot of extra work [costs] compared to, for example, a situation where the same capacity is divided into 15 projects that would have included expenses like temporary transmission and infrastructure costs related to each project. This is not the case here,” stated another official at MPUVNL.

The construction of a transmission substation within the solar park has also led to heightened interest among developers said a government official. This substation will take care of all evacuation from the park. Inefficient evacuation infrastructure was one of the major problems faced by developers in other solar parks.

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pressuring developers to match bids from the Rewa auction tariffs, which has happened in the past. A positive takeaway from this auction is it demonstrates that if you remove some of the developer risks by offering payment guarantees and deemed generation benefits in a park with a solid infrastructure, tariffs have room to come down. However - mostly thanks to Chinese module prices declining by about 30 percent over the last year - without which any bids to build projects below Rs.4.0/kWh would have been almost impossible,” he further commented.

Even though direct tariff comparison between countries is challenging due to many variables, the new low tariff of Rs.3.30 (~$0.0494)/kWh, a record low for India, is still not the lowest tariff in the world (see chart below).

IFC, a member of the World Bank Group, is extending its global expertise to structure and implement the transaction to help attract private investments of about $750 million (~Rs.50.2 billion) for the development of the 750 MW Rewa Solar Park.

(Source: Mercom Capital)

POTENTIAL IMPACT ON HUMANS IS REAL

- In the United States, cities at risk include New York, Boston, Miami, New Orleans, San Diego, LA, Seattle, Honolulu etc – some 20,000,000+ citizens
- In Europe – London, Dublin, Edinburgh, Amsterdam, Copenhagen, Lisbon, Barcelona, Marseille, Venice etc – some 35,000,000+
- In Asia it’s worse
- Of the 10 fastest-growing cities, eight are in Asia and six are on the coast
- Doesn’t include the key Asian cities of Tokyo, Manila, Singapore, Hong Kong, Shenzhen etc.
- If you include tidal rivers and deltas prone to flooding, the Asian population at risk is more than 1,000,000,000
- Globally – more than two billion real people and real risk!
- The problem isn’t climate change
- The problem is the Energy we use, and the way we use it!

(Source: Windpro)
In what may help reduce wind energy tariffs in the country, the 1 gigawatt (GW) tender floated by state-run Solar Energy Corp. of India (SECI) has received 2.6 times the quantum of bids offered for the grid linked capacity.

Experts say this may potentially bring down wind energy tariffs which currently ranges from Rs3.9 per unit to Rs5.9 per unit.

“The industry is eagerly awaiting the outcome,” said a wind energy developer participating in the auction process, requesting anonymity.

Another clean energy developer who also requested anonymity said, “There is a possibility that the tariffs may fall as low as sub Rs4 per unit.”

Bids totaling 2,600 MW have been received from 13 companies including Adani Power, Hero Future Energies Pvt. Ltd, Renew Power and Inox Wind for the two-stage process—technical and financial.

Those qualifying the technical bid stage will be eligible for the financial bid stage. Once, the financial bids are opened, a reverse bid auction process will be run to select the developers. The last date for the bid submission was 9 January.

“2,600 MW is the maximum bids received. The final award can be less than that. Financial bids are yet to be opened,” said Ashvini Kumar, managing director, SECI, declining to identify the companies who have taken part in the bidding process.

In India, which is the biggest greenhouse gas emitter after the US and China, renewable energy currently accounts for 15%, or 45,917 MW, of the total installed capacity of 3, 10,005 MW. Of this wind energy projects alone account For 28,083 MW, placing it at fourth position after China, the US and Germany.

“In the long run, the price difference between wind and solar will go. Now whether that happens in this tender or the next one (remains to be seen); they (wind and solar) will be competitive,” Kumar said while adding that the final tender will be awarded within the next two to three weeks.

Spokespersons for Inox Power and Hero Future Energies confirmed their participation in the tender.

Queries emailed to spokespersons for Adani Power and Renew Power remained unanswered at press time.

India plans to achieve 175GW of renewable energy capacity by 2022 as part of its climate commitments; wherein it has promised to achieve 40% of its electricity generation capacity from non-fossil fuel based energy resources by 2030.

This includes 60 GW from wind power, 100 GW from solar power, 10 GW from biomass and 5 GW from small hydro projects.

While remaining hopeful, experts sounded caution on the 1000 MW wind energy project tender.

“Just as the solar tariffs have benefited from lower panel prices, wind tariffs will also optimise as the auction will create pricing pressure on WTG (wind turbine generator) suppliers.

However, given that 70% of the bids are from Tamil Nadu, a high wind regime, the tariffs from this process should not be considered as a
benchmark by lower wind regime states going forward.

Overall, this is a good initiative and the sector will benefit from this auction,” said Srishti Ahuja, director, at consulting firm EY.

This comes at a time when the wind energy sector is grappling with issues such as squatters on good wind potential sites, inordinate delays in signing of power purchase agreements and untimely payments, and distribution firms shying away from procuring electricity generated from wind energy projects.

The other pertinent issues are: proper scheduling and forecasting of wind energy, availability of transmission facilities and rationalization of transmission tariffs for wind energy projects.

The union government has called a national review meet of states and the nodal agencies for ironing out issues plaguing the green energy sector as reported by Mint on Friday.

India has a wind power potential of around 302 GW at 100 meter hub-height.

(Source: Mint.com)

INDIA’S SOLAR POWER SECTOR TURNS A CORNER, THANKS TO REWA RECORD

TARIFF BID

The Power from sun has become a competitive energy versus the coal-fuelled conventional source of electricity, changing India’s energy discourse. India’s solar power sector has turned a corner after the record low-winning bids of Rs 2.97 per kilowatt-hour (kWh) to build 750 mega watt (MW) plant at REWA in Madhya Pradesh (MP).

The conversation has also moved from subsidy or the viability gap funding (VGF) being used to help bring the tariffs down as was demonstrated by the MP bids, as pointed out by Manu Shrivastava, managing director, Madhya Pradesh Urja Vikas Nigam Ltd (MPUVNL) in an interview to Mint. The bids were called by Rewa Ultra Mega Power Ltd, a joint venture of Solar Energy Corp. of India Ltd (SECI) and MPUVNL.

The issue also assumes importance given: India’s commitments within the United Nations Framework Convention on Climate Change and the country receiving solar radiation of 5 to 7 kWh per sq. m for 300-330 days in a year. A quick tariff comparison with conventional fuel sources such as coal drives home the point about solar energy no longer being a green fad but a game changer in India’s energy mix.

A case in point being state-run NTPC Ltd; India’s largest power generation utility, which supplies electricity from coal fuelled power projects at Rs 3.20 a unit. Also, according to Bridge to India, a solar energy consulting firm, successful bids for new thermal power plants in India in the past two years have been between Rs 3.93 and Rs 4.98 per kWh. “No one expected a tariff of Rs 2.97 per unit for the Rewa project... As compared to US¢ 4.4/kWh, the tariffs bid in West Asia have been as low as US¢ 3/kWh. This is primarily due to low cost of financing there,” added Sanjeev Aggarwal, managing director and chief executive of Amplus Energy Solutions Pvt. Ltd, which has offered to sell rooftop solar power at a record-low tariff of Rs 3 per unit. To be sure, Amplus Solar’s tariff has a 70% subsidy component. Experts believe the technological breakthrough that Indian solar energy sector awaits is commercially viable energy storage solutions which will also help towards grid stability. Source: Live Mint
Electric cars are set to arrive far more speedily than

The high-pitched whirr of an electric car may not stir the soul like the bellow and growl of an internal combustion engine (ICE). But to compensate, electric motors give even the humblest cars explosive acceleration. Electric cars are similarly set for rapid forward thrust. Improving technology and tightening regulations on emissions from ICES is about to propel electric vehicles (EVs) from a niche to the mainstream. After more than a century of reliance on fossil fuels, however, the route from petrol power to volts will be a tough one for carmakers to navigate.

The change of gear is recent. One car in a hundred sold today is powered by electricity. The proportion of EVs on the world’s roads is still well below 1%. Most forecasters had reckoned that by 2025 that would rise to around 4%. Those estimates are undergoing a big overhaul as carmakers announce huge expansions in their production of EVs. Morgan Stanley, a bank, now says that by 2025 EV sales will hit 7m a year and make up 7% of vehicles on the road. Exane BNP Paribas, another bank, reckons that it could be more like 11% (see chart). But as carmakers plan for ever more battery power, even these figures could quickly seem too low.

Ford’s boss is bolder still. In January Mark Fields announced that the “era of the electric vehicle is dawning”, and he reckons that the number of models of EVs will exceed pure ICE-powered cars within 15 years. Ford has promised 13 new electrified cars in the next five years. Others are making bigger commitments. Volkswagen, the world’s biggest carmaker, said last year that it would begin a product blitz in 2020 and launch 30 new battery-powered models by 2025, when EVs will account for up to a quarter of its sales. Daimler, a German rival, also recently set an ambitious target of up to a fifth of sales by the same date.

The surge has two explanations: the rising cost of complying with emissions regulations and the falling cost of batteries. Pure EVs, which send no carbon dioxide directly into the atmosphere, and hybrids, which produce far less than conventional engines, are a way to meet Europe’s emissions targets—albeit an expensive one. But the gains from cheaper methods such as turbocharging smaller engines, stop-start technology and weight reductions will no longer be enough, since a tougher testing regime, to be introduced in the wake of VW’s diesel-cheating scandal, will make those targets still harder to reach.

The hefty cost of preventing nitrogen oxide spewing from diesel engines, which emit far less carbon dioxide than the petrol equivalent, may see them disappear by 2025. Further development of ICES could be enough to meet the 2021 targets. Carmakers also need to be prepared to hit the next ones, says Andrew Bergbaum of AlixPartners, a consulting firm. These, yet to be finalised in the EU for carbon dioxide, may be as low as 68g/km by 2025 compared with 130g/km today.

Regulations are favourable outside Europe, too. In China more than 400,000 pure
EVs were sold last year, making it the world’s biggest market. The government, keen to clear the air of choking exhaust fumes, has plans for a quota that could insist that 8% of sales are EVs or hybrids by 2018. And even if Donald Trump relaxes American emissions standards, this will not hold back electrification. California, which accounts for one in eight cars sold in America, is allowed to set tougher environmental standards than the national ones. It, and seven of the other states that have adopted its emissions rules, have a target of 3.3m EVs on their roads by 2025.

Moving right along

Technology will have as much impact as politics. Vehicles that carmakers are forced to produce for the sake of the environment will become ones that buyers want for the sake of their wallets. EVs were once generally a second car for richer, environmentally minded drivers, prepared to pay a big premium for a vehicle with a battery that took an age to charge and had a limited range.

The falling cost of batteries will make the cost of owning and running an EV the same as that of a traditionally powered car in Europe by the early 2020s, even without the hefty government subsidies that many rich countries use to sweeten the deal. Better batteries should also conquer “range anxiety”—most pure EVs now run out of juice after around 100 miles (161km). If battery costs continue to tumble and performance improves at the current rate, the price of a car with a range of 300 miles could hit $30,000 by the early 2020s, according to Exane BNP Paribas. Slicker technology will also mean charging in minutes, not hours.

The lack of charging infrastructure still deters buyers, but signs of growth are encouraging. In most rich countries governments, carmakers and private companies are putting up the necessary cash. In America the number of charging points grew by more than a quarter to almost 40,000 in 2016. Even Shell and Total, are planning to put chargers on the forecourts of their petrol stations across Europe.

But EVs are not yet a profitable business for carmakers precisely because of their batteries. Chevrolet’s Bolt, on sale late last year, costs under $30,000 with subsidies and travels 238 miles between charges. But each sale will reportedly set General Motors back $9,000. Tesla’s rival, the Model 3, is set to go on sale later this year; the firm has yet to make an annual profit. Even Renault-Nissan, the world’s biggest EV manufacturer, loses money on electric models.

Research and development also costs a fortune. Daimler says it will spend €10bn by 2025 on just ten battery-powered models. Restructuring is also expensive. For a century carmakers have built factories, employed workers and developed a supply chain around the ICE. In one scenario Morgan Stanley reckons that VW’s entire car business could make a loss between 2025 and 2028 as it transforms itself.

Some carmakers are better placed than others for the transition. Profitable premium brands such as Daimler and BMW have the resources to invest and can be confident that their richer customers will be the first to switch to more expensive EVs. Mass-market carmakers have a trickier task, according to Patrick Hummel of UBS, a bank. Despite falling costs, a cheap EV for the mass market is still a distance away. The likes of Fiat Chrysler (whose chairman, John Elkann, sits on the board of The Economist’s parent company) or PSA Group, which makes Peugeots and Citroëns, have barely begun changing. But these carmakers, already operating with wafer-thin profit margins, must still invest heavily in anticipation of that moment.

EVs may eventually make more money than ICE cars as battery costs fall further. They are competitive in other ways too: EVs are simpler mechanically, and require less
equipment and fewer workers to assemble them. But carmakers first face a transition that will hit cashflow and profits. Getting ready for an electric race will be painful, but missing it altogether would be disastrous.

How drones are helping design the solar power plants of the future

At the edge of a plot of muddy farmland, a few miles down the road from the University of California at Davis, an engineer takes a few quick steps across crop rows and lets go of a three-foot drone. Within seconds, the device – which weighs less than 2lbs and carries a powerful camera – ascends hundreds of feet into the cold, clear, blue sky and begins to snap detailed photos of the ground far below, including a long row of large solar panels mounted on steel poles.

This flight is just a test, demonstrated by Kingsley Chen, the drone fleet coordinator for SunPower at the solar company’s research and development center, which is under construction and about a two-hour drive northeast of the San Francisco Bay Area. The drone will enable SunPower to survey a wide region and help design a solar power farm that can fit more solar panels on a piece of land, more quickly and for lower costs than it previously could.

The test highlights a growing use of the latest computing technologies – drones, robots, software, sensors and networks – by US companies to design, build and operate solar farms. After seeing the prices of solar panels drop dramatically over the past decade, companies are looking for new ways to cut costs and compete with fossil fuel power through project design.

Cutting down the amount of land used by solar farms has additional benefits, particularly in places like California. It minimizes environmental impact, an issue that can be controversial for large projects built for utilities because they tend to spread across hundreds of acres of land in remote regions. Some of these projects have provoked environmentalists, attracted lawsuits and forced solar companies, including SunPower, to commit money for land for wildlife conservation.

“Solar companies and service providers are using many different types of technology to optimize both the deployment of solar and the operations and maintenance of solar,” says Justin Baca, the vice president of markets and research for the solar group Solar Energy Industries Association. He adds: “It’s all about cutting costs.”

An increase in tech investment could help to boost growth as more large solar and wind farms come online in the US and worldwide over the next few decades. The US Energy Information Administration predicts that more solar power plants will be built and provide 1.4% of the country’s electricity by 2018, up from less than 1% in 2016. While solar makes up a tiny portion, it’s among the fastest-growing sources of new electricity generation capacity in the country.

Source: Guardian Sustainable Business
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