



# Embassy of India

## Tokyo

# NEWSLETTER

## JANUARY 2016

1. Visit of Minister for Power, Coal and New & Renewable Energy	2
2. Visit of Chief Minister of Haryana	2
3. Visit of Minister of State for Home Affairs	2
4. 67th Republic Day of India Celebrations	3
5. Ambassador of India's homage to Gandhiji on Martyr's Day	4
6. 119th Birth Anniversary of Netaji Subhash Chandra Bose	4
7. State Visit of President Francois Hollande of France	4
8. Udaipur, Rajasthan, India	5
9. New Session of VCC Classes	5
10. Seminar on Sea Food Promotion by MPEDA	6
11. Power Sector in India-Solar, Renewable and Wind Energy Sectors	7
12. Mars Orbiter Mission	10
13. Make in India Week	15
14. Trade Fairs & Business Exhibitions in India in Feb- April	15
15. Trade Queries from India	18
16. Photo Gallery	20



*Happiness is when what you think, what you say and what you do are in harmony*

*– Mahatma Gandhi*

### **Visit of Minister for Power, Coal and New & Renewable Energy for the 8<sup>th</sup> Energy Dialogue**

Hon'ble Minister for Power, Coal and New & Renewable Energy Shri Piyush Goyal visited Japan to participate in the 8<sup>th</sup> India-Japan Energy Dialogue from 12-15 January 2016. Apart from the Dialogue on 12 January 2016, he also met with leading Japanese financial institutions and captains of the Industry. A path breaking aspect of the 8<sup>th</sup> Energy Dialogue was the effort to go beyond government to government meetings and include business leaders from both sides – including representatives of industry and finance. The Minister also participated in a roundtable seminar at the Institute of Energy Economics of Japan (IEEJ). Interactive sessions between the Indian and Japanese companies were held on priority areas of (i) Clean Coal Technologies and Efficient Coal Based Power Generation (ii) Super-Efficient Appliances and LEDs and (iii) Energy Efficient Petroleum Refining-Energy Audit refineries. (iv) Energy Storage Technologies and (v) Smart Grids/Smart Meters. In addition to building on existing complementarities, avenues were explored to synergise Japanese technology and capital and Indian high skilled human resources and promote "Make in India." The sessions involved participation by over 30 Japanese companies involved in the energy sector and 25 Indian companies.

### **Visit of Chief Minister of Haryana**

A delegation led by Shri Manohar Lal, Hon'ble Chief Minister of Haryana visited Japan from 18<sup>th</sup> – 21<sup>st</sup> January, 2016 to promote "Happening Haryana – Global Investors Summit 2016" being organized in Gurgaon. During the first leg of the visit, the delegation met with leading Japanese institutions such as JICA, JBIC and JETRO as well as Japanese companies like Mizuho Bank, Suzuki Motors, Bank of Tokyo-Mitsubishi UFJ, Marubeni Corporation, NIDEC Corporation, Nikko Securities, Eternal Vision Co and Dhillon Marty Inc. An Investment Promotion Seminar was also held in the VCC Auditorium of the Embassy of India which was attended by 140 representatives from Japanese companies. On the second leg of the visit, the delegation met with official of Kansai Economic Federation (Kankeiren) in Osaka, OHMI Industries Ltd., Daiwa House Industry Co. Ltd. and Shiroki Corporation.

### **Visit of Minister of State for Home Affairs**

Hon'ble Shri. Kiren Rijiju, Minister of State (Home), participated in the Symposium on '*Shared Values and Democracy in Asia*' on 19 January, 2016 in Tokyo. This symposium is a follow up to the Hindu Buddhist Global Initiative for Conflict Avoidance and Environment Consciousness held in New Delhi on 3 September 2015 and is a part of the Global Hindu-Buddhist Initiative conceived during Hon'ble Prime Minister Narendra Modi's State Visit to Japan in August-September 2014. The symposium was organised by the Nikkei Inc and co-organised by The Tokyo Foundation, The Japan Foundation and the Vivekananda International Foundation (India) in collaboration with International Buddhist Conference and supported by the Ministry of Foreign Affairs, Japan.

Hon'ble Minister of State (Home) delivered the Opening Remarks at the Symposium, on behalf, of the Government of India. Hon'ble Prime Minister Shri Narendra Modi's video message was a very inspiring part of the proceedings touching upon the common value system, across Asian civilizations, which could avoid conflicts among humans and between humans and nature. Hon'ble Prime Minister also said that it is universally accepted that this century belongs to Asia. The Symposium was attended by renowned Asian political, social, academic and religious leaders from a number of Asian countries, apart from India and Japan, including Thailand, Myanmar, Malaysia, Indonesia, Mongolia, Philippines, Republic of Korea, Singapore and China.

Hon'ble Minister of State (Home) met Prime Minister H.E. Mr. Shinzo Abe at the official banquet hosted by the Prime Minister for the participants, at the Prime Minister's Official Residence, after the Symposium. He also travelled to Nara, as part of the Symposium, to visit the Todai-ji Temple, which has a long association with India, where the consecration or eye-opening of the towering statue of Lord Buddha was performed by an Indian monk, Bodhisena, in 752 AD. He also met the Governor of Nara HE Mr Shogo Aria at Nara.

## **67th Republic Day of India Celebrations**

The Embassy of India organised a Flag Hoisting Programme on the 67th Republic Day of India at the Chancery premises on 26 January 2016. Despite it being a working day in Japan, more than 250 Indian nationals attended the programme which started at 9 am. Ambassador of India H.E. Shri Sujan R. Chinoy unfurled the national flag which was followed by the singing of the National Anthem. Hon'ble Ambassador read out the address of the Hon'ble President of India to the nation in Hindi and English and gave welcoming remarks to the Indian community. This was followed by singing of patriotic songs by students of India International School in Japan and Global Indian International School in Japan. Light refreshments were served.

The Embassy also organized a reception in commemoration of the 67th Republic Day of India at Hotel Okura. Ambassador of India H.E. Shri Sujan R. Chinoy and officers of the Mission received over 700 Japanese dignitaries including Members of the Diet, captains of the business community, senior officers from various Ministries of the Japanese government, heads of cultural and religious organizations, think tanks, scientific community, academia, media, members of the Indian community and members of the diplomatic corps. The programme commenced with the national anthems of Japan and India. Hon'ble Ambassador addressed the gathering touching upon the significance of the Republic Day of India. Cultural performances of Bharatnatyam and Odissi dance were presented on the occasion. Hon'ble Ambassador drew a lucky prize of two return tickets to New Delhi, which was won by a Japanese guest. A commemorative photo exhibition of PM Abe's visit to India and Make in India was on display. Republic Day celebrations in Delhi was shown via live streaming.

***The weak can never forgive. Forgiveness is the attribute of the strong***

***– Mahatma Gandhi***

## **Amb. H.E. Shri Sujan R. Chinoy's homage to Mahatma Gandhi on 68th Martyr's Day**

Hon'ble Ambassador of India H.E. Shri Sujan R. Chinoy paid homage to Mahatma Gandhi on the 68th Martyr's Day on 30 January 2016 at Nipponzan-Myōhōji, also known as Japan Bharat Sarvodya Mitarata Sangha founded by Ven. Nichidatsu Fujii. Fujii Guruji as he was called by Gandhiji was close to him and was awarded Jawaharlal Nehru Award for International understanding in 1978. Hon'ble Ambassador delivered opening remarks about the message of Gandhiji's truth, non-violence and even touched upon his foresight in advocating gender equality and sustainable development. He presented a portrait of Gandhiji's stamps to Ven. Mikio Asai to display in the temple. Prof. Minoru Kasai, Professor Emeritus of International Christian University and recipient of the 2015 Jammalal Bajaj Award for promotion of Gandhian values gave a Commemorative lecture on "Visions of Mahatma Gandhi and prayers".

## **119th Birth Anniversary celebration of Netaji Subhash Chandra Bose**

Hon'ble Ambassador of India H.E. Shri Sujan R. Chinoy attended the 119th Birth Anniversary Celebration of Netaji Subhash Chandra Bose on 23 January 2016. The celebrations were organised by team Netaji and the Hindu Swayamsevak Sangh. In his address, Hon'ble Ambassador recalled that Netaji was a champion of closer ties between India and Japan. H.E. Mr. Hideo Onishi, Member of House of Representatives, Japan and Shri Girish Bapat, Hon'ble Minister of Food, Civil Supplies & Consumer Protection, Food & Drugs Administration & Parliamentary Affairs of Maharashtra also attended the event.

## **State Visit of President Francois Hollande of France to India**

President of France, H.E. Mr. Francois Hollande was on a three-day state visit to India from January 24-26, 2016. He was the Chief Guest at the Republic Day parade on 26 January. Hon'ble Prime Minister Shri Narendra Modi received President Francois Hollande at Chandigarh on 24 January and they paid a joint visit to the Government Museum & Art Gallery. President Hollande and Prime Minister Modi had a summit meeting in New Delhi on 25 January. 14 Agreements/ MoUs were signed during the visit including on the purchase of 36 Rafale Aircrafts and space cooperation between the space agencies ISRO and CNES, with a special satellite dedicated to climate change research. In pursuance of the 2008 Agreement on the Development of Peaceful Uses of Nuclear Energy between India and France, the two leaders encouraged their industrial companies to conclude techno-commercial negotiations by the end of 2016 for the construction of six nuclear power reactor units at Jaitapur in India. Noting the important role of energy storage to promote renewable energies, the two Leaders welcomed the signature of two MoUs between CEA (French Alternative Energies and Atomic Energy Commission), Crompton Greaves and Green Ventures. These MoUs will serve as templates for further practical collaboration in the field of renewable energy, including transfer of technology and know-how.

*Live as if you were to die tomorrow; Learn as if you were to live forever*

*- Mahatma Gandhi*

## Udaipur in Rajasthan, India



Often referred to as the 'Venice of the East', the lake city of Udaipur is known as the centre for performing arts and crafts. The famous Lake Palace, located bang in the middle of Lake Pichola is easily one of the most beautiful sights of Udaipur. Udaipur is also home to Jaisamand Lake, the largest artificial lake in Asia. The beautiful City Palace and Sajjan Garh (Monsoon Palace) add to the architectural beauty and grandeur of the city. The city is also known for its profusion of zinc and copper mines. The solar observatory in Udaipur is known as one of the best in Asia and has been modelled after the Solar Observatory at Big Bear Lake in Southern California. Udaipur is also renowned for its miniature paintings. The Shilpgram festival, held sometime around the New Year manages to pull in great crowds of people interested in arts and crafts.

Udaipur was founded in 1559 by Maharana Udai Singh II as a new capital of the Mewar kingdom. It is located in the fertile, circular Girwa Valley to the southwest of Nagda, which was the first capital of Mewar. Until Udaipur was built, the capital of Mewar was Ahar, a flourishing trade town.

### **Udaipur City Palace**

The City Palace towers over the Pichola Lake. The balconies, cupolas and towers of the palace give a wonderful view of the lake and the surrounding city. This complex actually consists of four major and several minor palaces that collectively form the magnificent City Palace. The main part of the palace is now preserved as a museum displaying ancient artefacts.

### **Lake Palace**

Now a hotel, The Lake Palace was originally called Jag Niwas Palace and served as a summer palace. Built between 1743 and 1746 on the island near Jagmandir Palace in Lake Pichola, the palace, which faces east, is a wondrous sight to behold. The walls made of black and white marbles are adorned by semi-precious stones and ornamented niches. Gardens, fountains, pillared terraces and columns line its courtyards.

### **Jag Mandir**

Jag Mandir is a palace built on an island on the Lake Pichola. Also called the 'Lake Garden Palace', the construction for this began in 1551 and was completed around 1652. The royal family used the palace as its summer resort and for hosting parties. Interestingly, Prince Khurram - later Emperor Shah Jahan - was given shelter here when he rebelled against his father Emperor Jahangir. The palace had such an impact on Emperor Shah Jahan that it went on to become the inspiration for one of the most magnificent Wonders of the World, the Taj Mahal.

### **Monsoon Palace**

Situated just outside Udaipur, this 19th century palace is built on top of Bansdara Mountain. Used as a monsoon palace and hunting lodge, its builder, Maharana Sajjan Singh, originally planned to make it an astronomical centre. The plan was cancelled with Maharana Sajjan Singh's premature death. It is still an awe-inspiring sight on the Udaipur skyline and offers spectacular views of the city and the areas around.

**How to Reach:** Dabok Airport, also known as Maharana Pratap Airport is the closest at about 25 km northeast of the city centre. There are daily flights from Delhi and Mumbai on Jet Airways, Air India and SpiceJet.

Udaipur is easily accessible by road from every major destination in India, including Chittorgarh, Ahmedabad, Jodhpur, Ajmer, Sawai Madhopur / Ranthambore, Jaipur, Bikaner, Agra, Delhi, Mumbai and Khajuraho.

Udaipur is connected by rail to several major cities in India including Chittorgarh, Ahmedabad, Ajmer, Sawai Madhopur, Jaipur, Agra, Delhi, Mumbai and Khajuraho.

### **Weather in January to March**

10°C - 27°C

4MM - 7MM

Courtesy: <http://tourism.rajasthan.gov.in> [www.mapsofindia.com](http://www.mapsofindia.com)

Please also visit [www.incredibleindia.org](http://www.incredibleindia.org)

**Seminar on Sea Food Promotion by MPEDA:** A promotional business seminar to promote the import of Indian Sea Food in Japan organized at the VCC Auditorium by MPEDA (Marine Products Export Development Authority) on 29 January. Managers and Directors of sea food importing companies in Japan were invited. Ambassador gave the opening remarks. A promotional power point presentation was given by Dr. Ram Mohan, Resident Director, Marine Products Export Development Authority. MPEDA is a nodal agency set up by the Govt. of India in 1972 for the promotion of seafood exports from India. The Seafood industry of India has come a long way and today seafood is exported to nearly 100 countries from India.

**New Session of VCC Classes:** The January – June session on VCC classes started from 11th January 2016. A total number of 324 students have applied for 459 courses in this session. A new class on flute is added in this session.

## **Power Sector in India - Solar, Renewable & Wind Energy Sectors**

### **Introduction**

Power is one of the most critical components of infrastructure crucial for the economic growth and welfare of nations. The existence and development of adequate infrastructure is essential for sustained growth of the Indian economy. India's power sector is one of the most diversified in the world. Sources of power generation range from conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power to viable non-conventional sources such as wind, solar, and agricultural and domestic waste. Electricity demand in the country has increased rapidly and is expected to rise further in the years to come. In order to meet the increasing demand for electricity in the country, massive addition to the installed generating capacity is required.

### **Market Size**

Indian power sector is undergoing a significant change that has redefined the industry outlook. Sustained economic growth continues to drive electricity demand in India. The Government of India's focus on attaining 'Power For All' has accelerated capacity addition in the country. At the same time, the competitive intensity is increasing at both the market and supply sides (fuel, logistics, finances, and manpower). The Planning Commission's 12th Five-Year Plan estimates total domestic energy production to reach 669.6 million tonnes of oil equivalent (MTOE) by 2016–17 and 844 MTOE by 2021–22. By 2030–35, energy demand in India is projected to be the highest among all countries according to the 2014 energy outlook report by British oil giant, BP. As of November 2015, total thermal installed capacity stood at 196.2 gigawatt (GW), while hydro and renewable energy installed capacity totaled 42.6 GW and 37.4 GW, respectively. At 5.8 GW, nuclear energy capacity remained broadly constant compared with the previous year. India's rooftop solar capacity addition grew 66 per cent from last year to reach 525 Mega Watts (MW), and has the potential to grow up to 6.5 giga watts (GW)<sup>1</sup>. India's wind power capacity, installed in FY2016, is estimated to increase 20 per cent over last year to 2,800 Mega Watt (MW)<sup>2</sup>, led by favourable policy support that has encouraged both independent power producers (IPP) and non-IPPs. India's wind energy market is expected to attract investments totaling Rs 1,00,000 crore (US\$ 15.7 billion) by 2020, and wind power capacity is estimated to almost double by 2020 from over 23,000 MW in June 2015, with an addition of about 4,000 MW per annum in the next five years.

## Investment Scenario

Around 293 global and domestic companies have committed to generate 266 GW of solar, wind, mini-hydel and biomass-based power in India over the next 5–10 years. The initiative would entail an investment of about US\$ 310–350 billion. Between April 2000 and September 2015, the industry attracted US\$ 9.97 billion in Foreign Direct Investment (FDI). Some major investments and developments in the Indian power sector are as follows: SunEdison, world's largest renewable energy company, plans to continue its focus on 'Make in India' by further reducing the cost of renewable energy and developing over 15 gigawatts (GW) of wind and solar projects in the country by 2022. ThyssenKrupp India, the Indian arm of the German engineering conglomerate, plans to make high-grade environment-friendly boilers which use less fuel, for the Indian power sector by collaborating with a foreign company. Aditya Birla Group has announced a partnership with the Abraaj Group, a leading investor in global growth markets, to build a large-scale renewable energy platform that will develop utility-scale solar power plants in India. Sterlite Grid, India's largest private operator of transmission systems, is joining hands with US major — Burn & McDonnell for its Rs 3,000-crore (US\$ 462.5 million) power transmission project in the Kashmir valley. Inox Wind Ltd, a subsidiary of Gujarat Fluorochemicals, a wind energy solutions provider, plans to double its manufacturing capacity to 1,600 MW at a total investment of Rs 200 crore (US\$ 31.6 million) by the end of the next financial year. The Dilip Shanghvi family, founders of Sun Pharma, acquired 23 per cent stake in Suzlon Energy, with a preferential issue of fresh equity for Rs 1,800 crore (US\$ 284.8 million). Reliance Power Ltd signed an accord with the Government of Rajasthan for developing 6,000 MW of solar power projects in the state over the next 10 years. Hilliard Energy plans to invest Rs 3,600 crore (US\$ 600 million) in Ananthapur district of Andhra Pradesh in the solar and wind power sector for the generation of 650 MW of power. Solar technology provider SunEdison signed a definitive agreement to acquire Continuum Wind Energy, Singapore, with assets in India. The company, headquartered in Belmont, California, would take over 242 MW of operating wind assets that Continuum owns and operates in Maharashtra and Gujarat as well as 170 MW of assets under construction. Japanese internet and telecommunications giant SoftBank, along with Bharti Enterprises (of Sunil Mittal) and Taiwanese manufacturing giant Foxconn, plan to invest US\$ 20 billion in solar energy projects in India.

### Government Initiatives

The Government of India has identified power sector as a key sector of focus so as to promote sustained industrial growth. Some initiatives by the Government of India to boost the Indian power sector: The Union Cabinet has approved the Ujwal DISCOM Assurance Yojna(UDAY) for financial turnaround and revival of power distribution companies (DISCOMs), which will ensure accessible, affordable and available power for all. The Government of India has resolved the issues regarding transfer of mining leases and grant of forest clearances to the winning bidders of coal blocks. It expects operations to start in about 10 more mines by March 2016, easing coal availability to the projects attached to these mines. The Ministry of Power has planned to provide electricity to 18,500 villages in three years under the DeendayalUpadhyaya Gram JyotiYojana (DUGJY). Out of these, 3,500 villages would receive electricity through off-grid or renewable energy solutions. The Ministry of New & Renewable Energy is implementing two national level programmes, namely Grid Connected Rooftop & Small Solar Power Plants Programme and Off-Grid &Decentralised Solar Applications, in order to promote installation of solar rooftop systems, as per Mr Piyush Goyal, Minister of State (Independent Charge) for Power, Coal & New and Renewable Energy. The Government of Odisha

plans to set up a large 1,000-MW solar power park under public-private partnership (PPP) mode involving an investment of about Rs 6,500 crore (US\$ 1 billion). The Government of Telangana plans to set up an incubator centre, in collaboration with University of Austin, Texas, for start-ups in the renewable energy sector, to support new companies entering the renewable energy market. A Joint Indo-US PACE Setter Fund has been established, with a contribution of US\$ 4 million from each side to enhance clean energy cooperation. The Government of India announced a massive renewable power production target of 175,000 MW by 2022; this comprises generation of 100,000 MW from solar power, 60,000 MW from wind energy, 10,000 MW from biomass, and 5,000 MW from small hydro power projects. The Union Cabinet of India approved 15,000 MW of grid-connected solar power projects of National Thermal Power Corp Ltd (NTPC). The Indian Railways signed a bilateral power procurement agreement with the Damodar Valley Corporation (DVC). The agreement was signed between North Central Railway and DVC. This is the first time the Railways will directly buy power from a supplier. US Federal Agencies committed a total of US\$ 4 billion for projects and equipment sourcing, one of the biggest deals for the growing renewable energy sector in India.

#### The Road Ahead

The Indian power sector has an investment potential of Rs 15 trillion (US\$ 237 billion) in the next 4–5 years, thereby providing immense opportunities in power generation, distribution, transmission, and equipment, according to Union Minister Mr Piyush Goyal. The government's immediate goal is to generate two trillion units (kilowatt hours) of energy by 2019. This means doubling the current production capacity to provide 24x7 electricity for residential, industrial, commercial and agriculture use. The Government of India is taking a number of steps and initiatives like 10-year tax exemption for solar energy projects, etc., in order to achieve India's ambitious renewable energy targets of adding 175 GigaWatts (GW) of renewable energy, including addition of 100 GW of solar power, by the year 2022. The cumulative installed capacity of solar power in India has crossed the 4 Gigawatt mark as of June 30, 2015. The government has also sought to restart the stalled hydro power projects and increase the wind energy production target to 60 GW by 2022 from the current 20 GW.

(Courtesy: India Brand Equity Foundation)

Please visit the following websites

<http://www.mnre.gov.in/> Ministry of New and Renewable Energy

<http://www.ireda.gov.in/> Indian Renewable Energy Development Agency Ltd.

## MARS ORBITER MISSION

### **MARS Exploration - Significance**

- Of all the planets in the solar system, Mars has sparked the greatest human interest as the conditions in Mars are believed to be hospitable since the planet is similar to Earth in many ways. Mars has surface features reminiscent of both the impact craters of the Moon and volcanoes, deserts and polar ice of Earth.
- Mars and Earth have almost equal period of revolution around its axis. Mars takes 24 hours and 37 minutes to complete one revolution around its axis. While Earth takes approximately 365 days to orbit around the Sun, Mars takes 687 days for the same. The gravity of Mars is roughly one- third of Earth's gravity and it has a thin atmosphere with a pressure of 1 % that of Earth.
- For ages, humans have been speculating about life on Mars. Recent discovery of Methane on Mars suggest that life could exist on Mars. It entails more and more understanding of the Martian surface, its topography, geology, landforms, mineralogy, and its upper atmosphere to understand the evolution of universe.
- The Indian Mission to Mars is primarily intended to establish Indian technological capability to reach the Mars, orbit around it and also provide an excellent opportunity, to the scientific community, to further understand the Martian Science. Also, having demonstrated the technological capability in reaching the Moon, the next logical step go forth into interplanetary space is Mars.

### **Indian MARS Orbiter Mission**

- Mars Orbiter Mission is ISRO's first interplanetary mission with an orbiter craft designed to orbit Mars in an elliptical orbit of 366 km x 80000 km. Mars Orbiter Mission (MOM) is a complex technological mission considering the critical mission operations and stringent requirements on propulsion, communications and other bus systems of the spacecraft.
- Being the first Indian mission to the planet Mars, the primary technological objective is to design and realize a spacecraft with a capability to - perform Earth Bound Manoeuvre, reach Mars (*Martian Transfer Trajectory*) with the least amount of fuel, Mars Orbit Insertion and then to orbit around Mars. It has been configured to undertake limited scientific studies during the orbital life of the spacecraft, using the five Indian scientific instruments onboard to study the Mars surface and its atmosphere.

### Scientific Instruments (Payload) on the Orbiter

Science Theme	Payload	Primary objective
Atmospheric studies	Lyman Alpha Photometer (LAP)	Measures relative abundance of deuterium and hydrogen.  Measurement of Deuterium /Hydrogen (D/H) Ratio allows understanding of the loss process of water from the planet.
	Methane Sensor for Mars (MSM)	Measures Methane (CH <sub>4</sub> ) in the Martian atmosphere with high level of accuracy and map its sources.
Plasma and Particle environment studies	Mars Exospheric Neutral Composition Analyser (MENCA)	Map neutral composition in exosphere, Martian upper atmosphere
Surface Imaging studies	Mars Color Camera (MCC)	This tri-color Mars Color Camera gives images of Martian surface. It is useful for monitoring the dynamic events and weather of Mars. It will also be used for probing the two satellites of Mars – Phobos and Deimos.
	TIR imaging spectrometer (TIR)	Measures thermal emission and can be operated during day & night. It will map the surface and mineral composition of Mars.

### Technological Challenges of Mars Orbiter Mission

- To provide robust thermal environment and augmented radiation shielding to the spacecraft & payloads to cope with a wide range of thermal environment (*from Near Earth conditions to Mars conditions*) and harsh radiation conditions due to prolonged exposure.
- To build a robust and reliable propulsion system (*Liquid Engine*), which needs to restart after almost 300 days of voyage to insert the spacecraft into an orbit around Mars.
- To build high level of onboard autonomy within the Orbiter to deal with communication delay of the order of 40 minutes. Autonomy logics manage the spacecraft when communication interruptions occur when – (i) the spacecraft is occulted by planet Mars; (ii) Whiteouts/ Blackouts due to Sun; (iii) spacecraft enters Safe-mode
- To augment Deep Space Network to be able to command the spacecraft from the ground station when it is at a distance of nearly 400 Million km, which is 1000 times more than the distance Moon and earth.

### **Launch and Post Launch Orbit Maneuvers**

- The country witnessed with pride, when India's first interplanetary spacecraft "Mars Orbiter" was successfully launched on November 05, 2013 at 2:38 pm by India's Polar Satellite Launch Vehicle PSLV-C25 from Satish Dhawan Space Centre. Mars Orbiter was precisely injected into an elliptical earth orbit (with a perigee of 248.4 km and an apogee of 23,550 km, inclined at an angle of 19.27 deg to the equator).
- Subsequent to the six orbit-raising manoeuvres, crucial the Tran-Mars Injection Manoeuvre was precisely executed on December 1, 2013 and the Spacecraft was placed on course to the Red Planet along a helio-centric path of 680 million km.

### **Mars Orbit Insertion on 24th Sep 2014**

- After a 300 days journey in deep space, on September 24, 2014, India's Mars Orbiter Spacecraft successfully entered into an elliptical orbit around planet Mars by firing its 440 Newton Liquid Apogee Motor along with eight smaller liquid engines.
- With successful Mars Orbit Insertion, ISRO became the fourth space agency to successfully send a spacecraft to Mars orbit and India became the first country in the world to do so in its first attempt.

### **Mars Orbiter Successfully handled Solar Conjunction**

- Solar Conjunction is a natural phenomenon in which the Mars, the Sun and the Earth get aligned. Such alignment affects all communication signals from Mars Orbiter towards the Earth. Mars Orbiter is built with onboard autonomy to handle such blackout operations.
- Mars Orbiter went under 'solar conjunction' at Mars, which means the Orbiter, which is orbiting Mars, is behind the Sun as viewed from the Earth. As a result of this event, which happens once in 2.2 years for Mars, communication signals from the spacecraft are severely disrupted by the Sun's corona (outer atmosphere).
- Mars Orbiter was under solar conjunction from May 27<sup>th</sup> to 1<sup>st</sup> July 2015. The communications from ground to spacecraft were totally stopped with effect from May 28, 2015. No commands were transmitted to the spacecraft during this period and all payload operations were suspended.
- In the month of July, 2015; the Mars orbiter successfully came out of the solar conjunction. It is worth mentioning that No reconfiguration of the spacecraft was required, as the on-board autonomy properly functioned.

### **Current Status**

- India's Mars Orbiter Mission (MOM) has completed one year around Mars on September 24, 2015 and accomplished its planned mission objectives. MOM and all its scientific payloads are in good health and it continues to provide valuable data of Mars surface and its atmosphere. The increased duration of observation of Mars by five scientific payloads will enhance the planetary science data and would also enable coverage of Mars in different seasons.
- The images of Mars captured by the Mars Colour Camera have been received and found to be of very good quality. The Mars Colour Camera has so far produced 513 images.
- Joint morphological studies using MCC and the high resolution mineralogical data with the NASA CRISM data was carried out, which enables the identification of different compounds like sulphates and ferrous based compounds.
- The dust patterns around high altitude regions and in Valles were studied and mean height of dust layer was estimated to be ~1.5 km. Albedo using the 1.65 micron studies of the reference channel of Methane sensor for Mars (MSM) was also estimated.

### **Significant achievements & Recognitions**

- First interplanetary mission realized by India and first Indian spacecraft to incorporate full scale on-board autonomy to overcome the long distances and the communication gaps due to non-visibility periods.
- First Mars mission in the world to succeed Mars Orbit Insertion in first attempt.
- First Indian spacecraft to successfully survive Van Allen belt crossing 39 times. First Indian spacecraft to escape the Sphere Of Influence of Earth and orbit Sun.
- Most economical interplanetary mission in the world and paved way for cost-effective access to deep space.
- Indian Space Research Organization (ISRO) - Mars Orbiter Mission (MOM) team won the US based National Space Society's "Space Pioneer Award" for science and engineering category for the year 2015.
- The Indira Gandhi Prize for Peace, Disarmament and Development is awarded to ISRO in recognition of its path-breaking achievement, culminating in Mars Orbiter Mission, its significant contribution in strengthening international cooperation in peaceful use of outer space.

## IRNSS: Indian Regional Navigation Satellite System

IRNSS is an independent regional navigation satellite system being developed by India. It is designed to provide the position and timing services through an independent Indian regional navigation satellite constellation of seven satellites. The main objective of IRNSS System is to provide positioning services with an absolute position accuracy of better than 20 meters over Indian Land Mass and a region extending to the about 1500 Kms around India.

**IRNSS** consists of seven satellites in a constellation, three satellites in geostationary orbit (GEO) and four satellites in geosynchronous orbit (GSO) with inclination of 29° to the equatorial plane. Three GEO satellites placed at 32.5°E, 83°E & 131.5°E orbital locations and two geosynchronous satellites each placed in the GSO with an equator crossing at 55°E & 111.75°E with an inclination of 29°.

A first four IRNSS satellites viz., IRNSS-1A, 1B, 1C and 1D were successfully launched on July 02, 2013, April 04, 2014, October 16, 2014 and March 28, 2015 respectively and are already operational in orbit. With the operationalisation of four navigational satellites in orbit, it is now possible to provide Position, Navigation and Timing services.

### ❖ **Launch of Fifth IRNSS Satellite - IRNSS-1E:**

ISRO's Polar Satellite Launch Vehicle, PSLV-C31, successfully launched the 1425 kg IRNSS-1E, the fifth satellite in the Indian Regional Navigation Satellite System (IRNSS) on January 20, 2016 at 09:31 hrs (IST) from Satish Dhawan Space Centre SHAR, Sriharikota. This is the thirty second consecutively successful mission of PSLV and the eleventh in its 'XL' configuration.

IRNSS-1E Satellite was injected to an elliptical orbit of 282.4 km X 20,655.3 km inclined at an angle of 19.21 degree to the equator (very close to the intended orbit). After injection, the solar panels of IRNSS-1E were deployed automatically. In the coming days, four orbit manoeuvres will be conducted from Master Control Facility to position the satellite in the Geosynchronous Orbit at 111.75 deg East longitude with 28.1 deg inclination.

A number of ground stations responsible for the generation and transmission of navigation parameters, satellite ranging and monitoring, etc., have been established in eighteen locations across the country.

### ❖ **Applications:**

- Terrestrial, Aerial and Marine Navigation
- Disaster Management, Vehicle Tracking , Fleet Management
- Precision timing applications viz. distributed survey systems, power grid synchronization
- Mapping and Geodetic data capture
- Visual and voice navigation for drivers

## **Make in India Week 13-18 February 2016**

India's commercial capital, Mumbai is geared up for Make in India Week, a flagship event to provide greater momentum to the Make in India initiative, to showcase to the world the achievements of the nation in its manufacturing sector and to promote India as preferred manufacturing destination globally. Set against the vibrant backdrop of Mumbai, this week long calendar would offer unprecedented access, insights and opportunities to connect and collaborate with India and global industry leaders, visionaries, academicians, central and state administrations. Creating a confluence of policymakers, industry, entrepreneurs and academia to showcase, connect and collaborate, as well as highlight the people, policies and partnerships driving India's new manufacturing revolution, the Week would spark a renewed sense of pride in India's manufacturing and take corporate and public participation to the next level. The Prime Minister has pitched the Make in India story to investors across the globe, and will inaugurate the marquee event which will host government delegation from 49 nations and business delegations from 68 countries during the Week. Speaking at the Curtain Raiser press conference the week-long event organized to showcase India's manufacturing prowess, Minister of State (Independent Charge) for Commerce & Industry Minister of State for Commerce and Industry, Government of India, Nirmla Sitharaman said that "The government has incessantly pushed policy measures to boost manufacturing and today FDI in India is growing at 48 per cent while globally there is a sharp fall. The global business community has responded enthusiastically to Indian economy's revivalist fervour and Make in India Week will further showcase the nation's accomplishments in manufacturing and position India as investment, innovation and manufacturing hub."

## **Trade Fairs & Business Exhibitions in India in February – April, 2016**

<b>S N</b>	<b>Event</b>	<b>Organizer</b>	<b>Product Profile</b>
1	<b>Make in India Week</b>  February 13-18, 2016	Department of Industrial, Policy Promotion (DIPP), Govt. of India in collaboration with State Government of Maharashtra and Confederation of Indian Industry (CII)  <a href="http://www.makeinindia.com/home">http://www.makeinindia.com/home</a>	A Government of India initiative to showcase the potential of design, innovation and sustainability across India's manufacturing sectors.
2	<b>IHGF (Spring) Delhi Fair, Greater Noida, India</b>  February 20-23, 2016	Export Promotion Council for Handicrafts (EPCH)  <a href="http://www.epch.in">http://www.epch.in</a>	International trade fair on Houseware, Decorative & Gifts; Furniture & Home Accessories; Home Textiles, Furnishings & Floor Coverings; Fashion jewellery, Accessories & Bags; Christmas Decorations, Candles & Incense
3	<b>India Ceramics 2016</b>  March 2-4, 2016	MesseMunchen International and Unifair Exhibition Service  <a href="http://www.indian-ceramics.com/index.html">http://www.indian-ceramics.com/index.html</a>	International trade fair on Ceramic Industry
4	<b>Plastasia 2016</b>	Triune Exhibitors Pvt. Ltd.	International trade fair on Plastic

	March 3-6, 2016	<a href="http://www.triuneeexhibitors.com">www.triuneeexhibitors.com</a>	Industry
5	<b>5<sup>th</sup> edition of India Aviation 2016</b> March 16-20, 2016	Ministry of Civil Aviation, Govt. of India and Federation of Indian Chamber of Commerce & Industry (FICCI) <a href="http://india-aviation.in">http://india-aviation.in</a>	International trade fair on Aircraft Manufacturing, Aircraft Machinery & Equipment, Aircraft Interiors, Airlines, Airlines Services & Air Cargo, Airports Infrastructure & Equipment, Space Industry and Skill Development & Aviation Training Institutes
6	<b>India International Leather Fair (IILF), Kolkata</b> March 18-20, 2016	India Trade Promotion Organization <a href="http://www.iilfleatherfair.com/leatherfair/kolkata/index.php">http://www.iilfleatherfair.com/leatherfair/kolkata/index.php</a>	International trade fair on Leather products, Raw materials, Chemicals, Machinery, Accessories, Components
7	<b>CAPINDIA Mega Exhibition 2016</b> March 20-22, 2016	CAPEXIL (formerly Chemicals & Allied Products Export Promotion Council) <a href="http://capindia.org.in">http://capindia.org.in</a>	International networking event in Chemicals and Allied Products & Plastics Sector.
8	<b>Gem &amp; Jewellery India International Exhibition</b> March 18-20, 2016	UBM India and Madras Jewellers & Diamond Merchants Association (MJDMA) <a href="http://chennai.jewelleryfair.in">http://chennai.jewelleryfair.in</a>	International trade fair for Gem & Jewellery
9	<b>DieMould India 2016</b> April 6-9, 2016	Tool and Gauge Manufacturers Association – India <a href="http://www.diemouldindia.org/index.php">http://www.diemouldindia.org/index.php</a>	International trade fair for Die & Mould Industry
10	<b>2<sup>nd</sup> edition of Global Exhibition on Services (GES)</b> April 21-23, 2016	Ministry of Commerce and Industry, Govt. of India, Services Export Promotion Council (SEPC), India Trade Promotion Organization (ITPO) and Confederation of Indian Industry (CII) <a href="http://www.gesdelhi.in/ges-2016">http://www.gesdelhi.in/ges-2016</a>	An International exhibition on Service sector industry which includes IT and Telecom, Tourism, Media & Entertainment, Healthcare, Logistics, Professional Services, Education, SMEs in Services, R&D, Space, Financial

			Services, Skills
11	<b>5<sup>th</sup> edition of Technotex – 2016</b> April 21-23, 2016	Federation of Indian Chambers of Commerce and Industry (FICCI) <a href="http://www.technotexindia.in">http://www.technotexindia.in</a>	International trade fair for all kinds of technical textiles.
12	<b>IPHEX 2016 – International Exhibition for Pharma and Healthcare</b> April 27-29, 2016	Pharmaceutical Export Promotion Council of India (Pharmexcil) <a href="http://www.iphex-india.com">http://www.iphex-india.com</a>	International Expo for Pharmaceuticals and Healthcare products.

### Trade Queries from India

SN	Company Name	Commercial Interest
1.	Mr. KhalifAhamed M/s Ahmed Traders Add: 46-B North Car Street Dindigul – 624001 Tamil Nadu Mob: 91-8903684848 <a href="mailto:khalif08@live.in">khalif08@live.in</a>	Spice (Cardamom & Saffron)
2.	Mr. K.B. Kishan Kumar M/s Evergreen Exports Add: 9/4 Balaji Street Nagar Villivakkam, Chennai 600 049 Tel: 91-44-4282-9564 Mob: 9962072357 <a href="mailto:evergreenexportsintl@gmail.com">evergreenexportsintl@gmail.com</a>	Natural indigo dyestuff, groundnuts, sawdust briquettes.
3.	Mr. M.S. Mani M/s Aarnasri Export Add: 108-A/I Munichalalai road, Madurai 625 009 Tamil Nadu State Tel; 91-452-2336890 Mob: 91-9788146890 <a href="mailto:aarnasriexports@gmail.com">aarnasriexports@gmail.com</a>	Vegetables, potatoes, red chili powder, turmeric.
4.	Mr. Abhijit Kumar Mitra Add: 1 AmbedkarSarani Non-company housing complex, Durgapur 713 216 Dist. Burdwan West Bengal  CB-196 Sector 1 Salt Lake City Kolkata 700 091 Mob; 91-9475012364 91-9732256048 <a href="mailto:Abhimitra.2009@gmail.com">Abhimitra.2009@gmail.com</a>	Leather & Handloom (Textile)
5.	Mr. AlkeshAhir M/s Namasvi International Add: 13 VitthalnagarSoc Camp Road Shahibag, Ahmedabad, Gujarat Tel; 91-7383552240 91-9427820493 <a href="mailto:info@namasviglobal.com">info@namasviglobal.com</a> <a href="mailto:namasvi.info@gmail.com">namasvi.info@gmail.com</a> <a href="http://www.namasviglobal.com">www.namasviglobal.com</a>	Rice, wheat, wheat flour, spices, fruits, vegetables.
6	Mr.N.Krishnamurthy M/s Harsa Exim	Coconut, herbal products, sugar, honey and handicraft products.

	Add: 2/11 Chitthampalam (post) Palladam TK Tirupur Dt. Tamil Nadu Mob; 91-9894712675 <a href="mailto:harsaexim@gmail.com">harsaexim@gmail.com</a> <a href="http://www.harsaexim.com">www.harsaexim.com</a>	
7	Mr. Rohit Gupta M/s Goodrich Agrochem Pvt. Ltd. Add; S.C.O.2,3,4, First floor, Sector 8 Karnal 132 001 Haryana Tel: 91-184-4043441 <a href="mailto:info@goodrichworld.com">info@goodrichworld.com</a>	Potato (potato flakes)
8	Mr. Karikalan K M/s SP Export Add: #54 Patti Street Seepalakottai Post Uthamapalayam (TK) Theni District 625 540 Mob:91-8148499496 <a href="mailto:karikalankamatchi@gmail.com">karikalankamatchi@gmail.com</a>	Fruits, spices, vegetables.
9	Mr. VirenBhindora M/s Jubilant Internationals Add: Jalaram Krupa, 5-Nalanda Soc, Kalawad Road, Rajkot 360 005 Gujarat, India Tel; 91-9428892214 91-8460952597 <a href="mailto:info@jubilant.com">info@jubilant.com</a> <a href="http://www.jubilantint.com">www.jubilantint.com</a>	Garlic, onion, potato, spice products.
10	Mr. JatinSutariya M/s Akshar Enterprises Add: C.S.Road 2 Anand Nagar 400 068 Mumbai, Maharashtra Tel: 91-224012666 <a href="mailto:info@aksharchemical.com">info@aksharchemical.com</a> <a href="mailto:india.akshar@gmail.com">india.akshar@gmail.com</a>	Guar gum powder.
11	Mr. Arjun Reddy M/s Malligaarjun Import & Export Add: NIL Mob:91-8608121422 <a href="mailto:arjun.jaexim@gmail.com">arjun.jaexim@gmail.com</a>	Pebble stone.
12	Mr.Saparish M/s Tarrow Exports Mob:91-9788590984 91-9095811856 <a href="mailto:tarrowexports@gmail.com">tarrowexports@gmail.com</a> <a href="http://www.indiamart.com/tarrowexports/">www.indiamart.com/tarrowexports/</a> <a href="http://www.tarrowexports.com">www.tarrowexports.com</a>	Coconut oil & groundnut oil
13	Mr. A. Velan M/s YOUBE Export <a href="mailto:youbexport@gmail.com">youbexport@gmail.com</a>	Herbal & mats (korai)
14	Mr. Franklin Fernandes M/s Garware Polyester Add: Corporate Off: 50-A Swami Nityanand Marg Western Express Highway, Vile Parle (East) Mumbai 400 057 India Tel: 91-22-66988000 Fax:91-22-28248155 91-2228248199 <a href="mailto:franklin@garwarepoly.com">franklin@garwarepoly.com</a> <a href="http://www.garwarepoly.com">www.garwarepoly.com</a> <a href="http://www.garwaresuncontrol.com">www.garwaresuncontrol.com</a>	Window films (polyester film)
15	Mr. Puneet Jain M/s Natural Agro Ex	Groundnut products.

	Add: 501 Class of Pearl, K-48-49 Income Tax Colony, Durgapura, Jaipur 302 018, Rajasthan Tel: 91-9929943477 <a href="mailto:puneet@naturalagroex.in">puneet@naturalagroex.in</a> <a href="http://www.naturalagroex.com">www.naturalagroex.com</a>	
16	Mr. Kaushik Bhatt M/s Ieterinternational Add: 202-hans Residency, Niyolgam, Surat, Gujarat Tel: 919998535468 <a href="mailto:kaushikbhatt1987@gmail.com">kaushikbhatt1987@gmail.com</a>	Self-adhesive jumbo roll tape
17	M/s Kewin Chemicals Pvt.Ltd. Add: M-3/31, Ami Appt., Nr.Tele-Exch, Naranpura, Ahmedabad 380 063, Gujarat. Tel: 0091-79-40327970 Fax: 0091-79-27541087 <a href="mailto:KCTL96@GMAIL.COM">KCTL96@GMAIL.COM</a> ; <a href="mailto:miteshshah@kewinchem.com">miteshshah@kewinchem.com</a>	Dye & dyes intermediates
18	Mr. Rubin Rumao M/s WAAREE ENERGIES LIMITED. Add: 602, Western Edge-I, Off. Western Express Highway, Borivali(E), Mumbai 400066, Maharashtra, India. <a href="tel:+91-22-66444420">Tel: +91-22-66444420</a> Mob: +91-8879091527 <a href="mailto:bubinarumao@waaree.com">bubinarumao@waaree.com</a> <a href="http://www.waaree.com">www.waaree.com</a>	Technology transfer, joint venture, investment and solar power development.

***I am prepared to die, but there is no cause for which I am prepared to kill.***

***- Mahatma Gandhi***

## Photo Gallery



Hon'ble Minister Power, Coal and New & Renewable Energy H.E. Shri Piyush Goyal with Japan's Minister of Economy, Trade and Industry (METI) H.E. Mr. Motoo Hayashi.



Hon'ble Chief Minister of Haryana, H.E. Shri Manohar Lal visit Japan to promote Happening Haryana



Hon'ble Minister of State (Home) H.E. Shri Kiren Rijju met H.E. Prime Minister Shinzo Abe at the official banquet hosted by the Prime Minister for the participants of the Symposium