



2nd Space Exploration Conference

# **COMMERCIAL SPACE: BACKGROUND AND PERSPECTIVES**

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**President & General Designer**

**Houston, USA  
December, 2006**

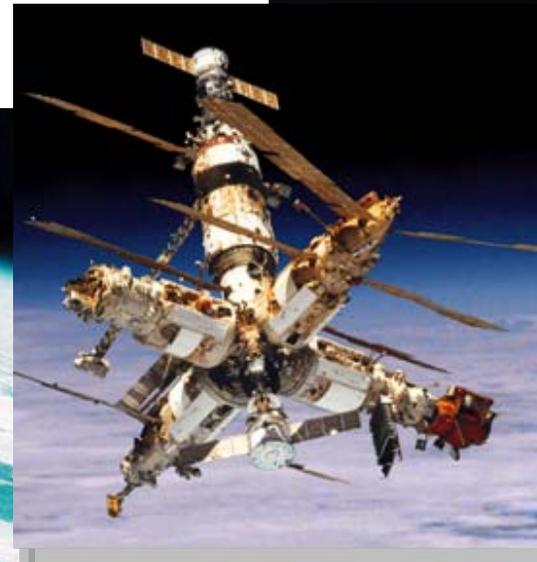
# ORBITAL STATIONS OF THE USSR AND RUSSIA



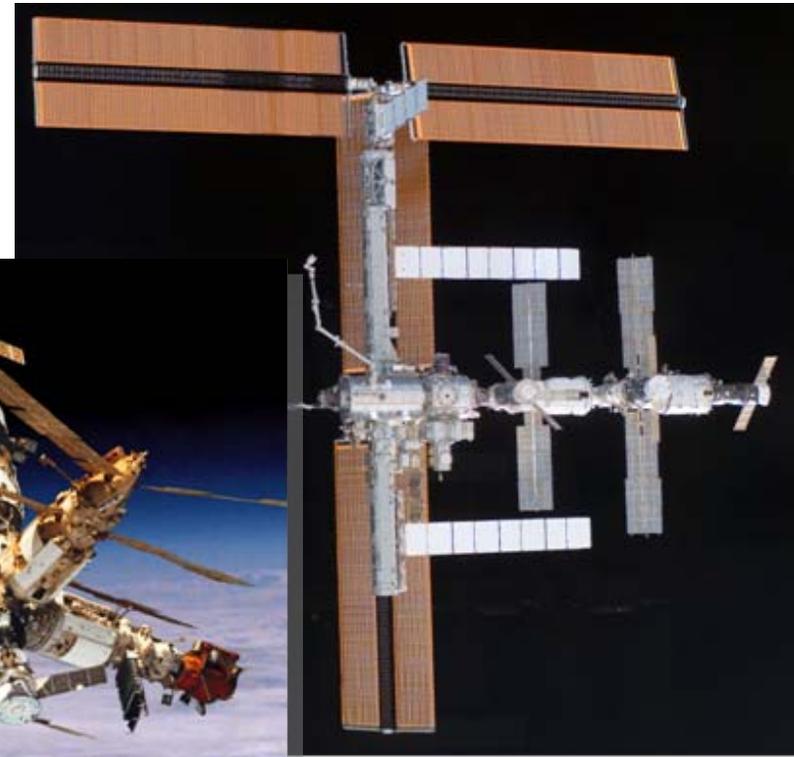
**SALYUT -  
SALYUT-5  
1971-1977**



**SALYUT-6  
SALYUT-7  
1977-1991**



**MIR  
1986-2001**



**ISS RUSSIAN  
SEGMENT  
SINCE 1998**

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- Space exploration is no longer a field characterized only by prestigious technical achievement.
  - Several space business sectors are now rapidly evolving:
    - Space communication
    - Commercial launch systems
    - Earth remote sensing and monitoring
    - Commercial space flights

# SEA LAUNCH PROJECT



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- There has been positive experience of international cooperation in development and flight support of the International Space Station.
  - Growth in the number of participants in space markets, along with increased total revenue, create conditions encouraging competition and service price reduction.
  - Such developments contribute to market expansion.

# COMMERCIAL FLIGHTS TO ISS RS

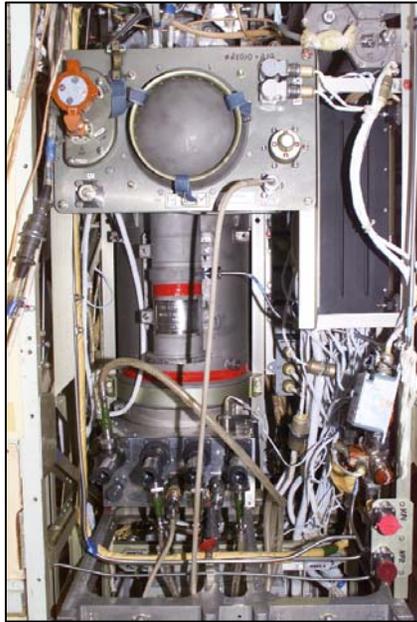


- A permanent R&D platform
- An international spaceport for future exploration
- A basis for long-duration life support technology
- A platform for scientific and technological investigation
- A foundation for manned activities in space

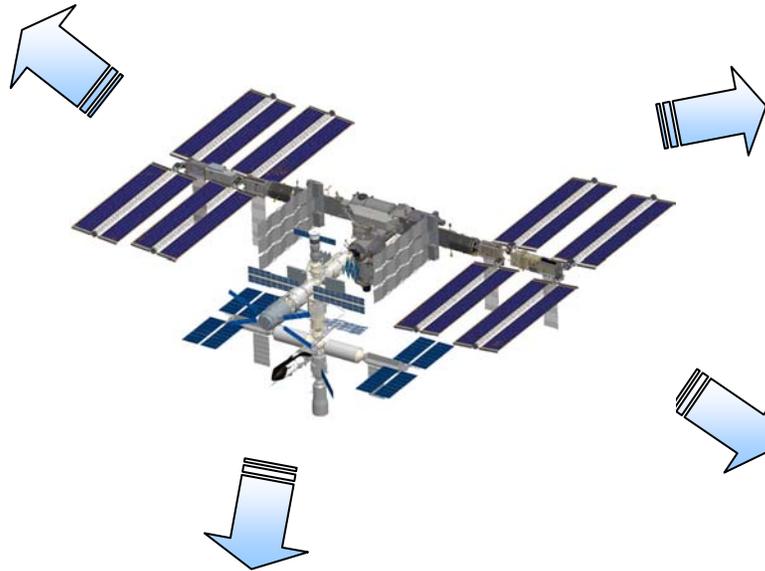
# TESTS OF LARGE ANTENNAS AND REFLECTORS ON MIR



# TESTS TO SUPPORT LONG-DURATION INTERPLANETARY MISSIONS



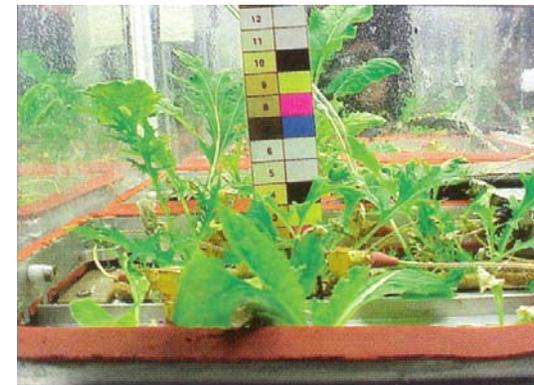
**TESTS OF THE CLOSED-LOOP  
LIFE SUPPORT SYSTEMS**



**MEDICAL EXPERIMENTS TO  
DEVELOP HEALTH SUPPORT  
METHODS FOR LONG-TERM SPACE  
MISSIONS**



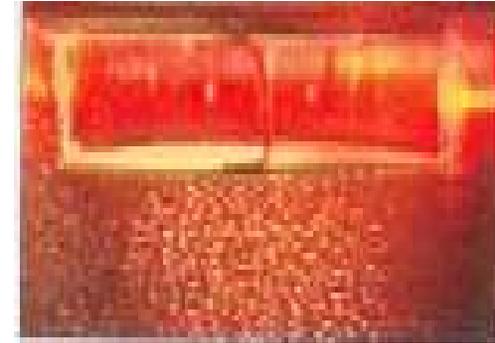
**FLIGHT TESTS OF THE ONBOARD SYSTEMS WITH LONG LIFE  
TIME**



**TESTS OF THE CLOSED-LOOP  
ECO SYSTEM**



# VERIFICATION OF ADVANCED SPACE TECHNOLOGIES FOR THE EARTH INDUSTRIAL UTILIZATION



**MANUFACTURING OF  
ADVANCED  
MATERIALS**



**BIOMEDICAL RESEARCH**

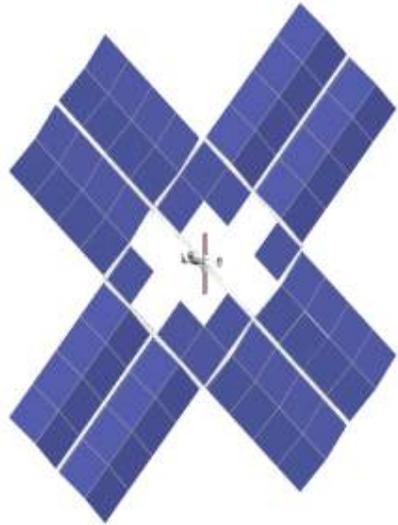


**TESTS OF THE EARTH REMOTE  
SENSING TECHNOLOGIES**



**BIO TECHNOLOGICAL  
RESEARCH**

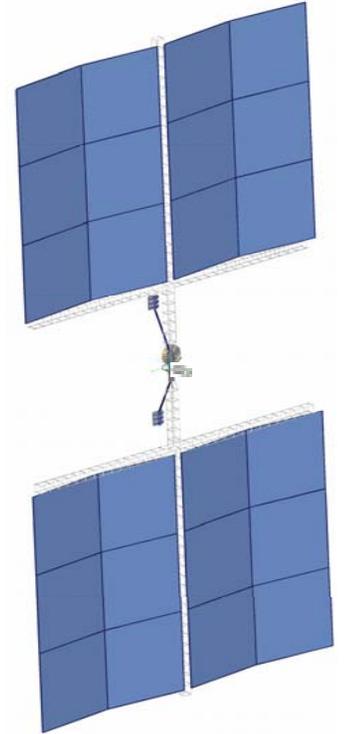
# ISS AS ASSEMBLY AND MAINTENANCE BASE



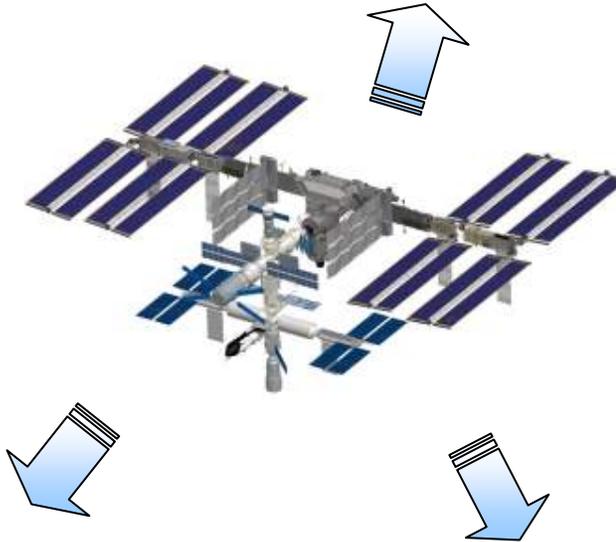
**ASSEMBLY AND MAINTENANCE OF THE MARS EXPEDITION SYSTEM**



**REFUELING AND MAINTENANCE OF THE TUGS FOR THE MOON MISSIONS**



**ASSEMBLY AND MAINTENANCE OF THE ELECTRICAL TUGS FOR THE MOON MISSIONS**



**ASSEMBLY OF THE LARGE SPACE STRUCTURES**

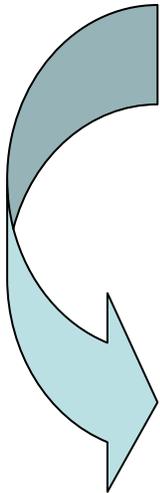


**POST-FLIGHT QUARANTINE**

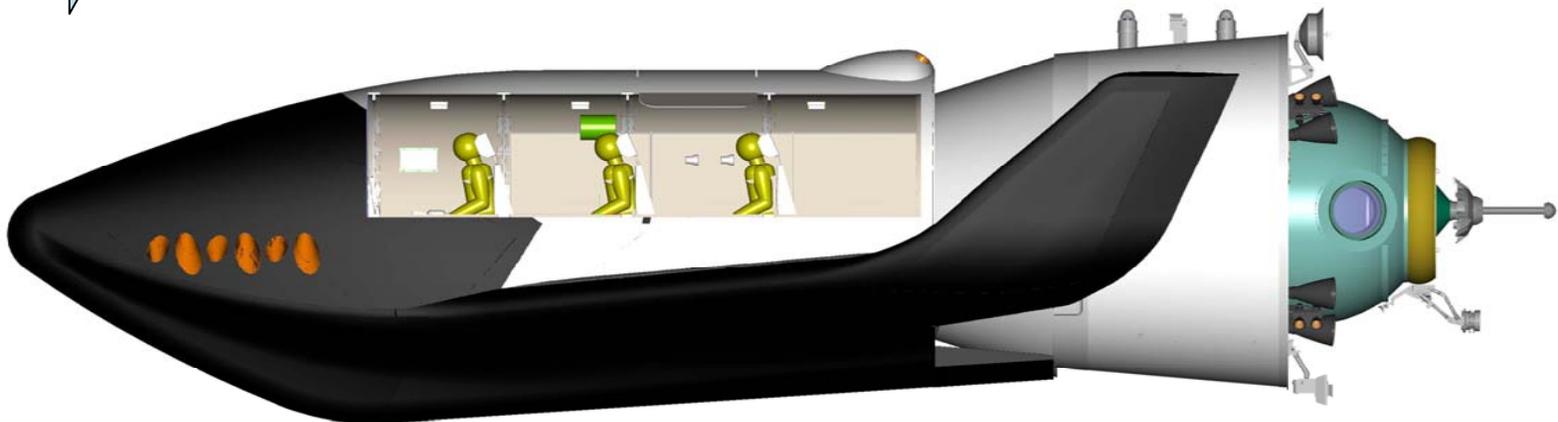
- RSC Energia's Clipper program is designed to produce new manned and cargo space vehicles.
- Transportation-related cost reduction can be achieved through use of reusable spacecraft.
- Evolution can occur from Soyuz to Clipper and from Progress to Space Tug Parom.

# CREW TRANSPORT VEHICLE EVOLUTION: FROM SOYUZ TMA TO CLIPPER

## SOYUZ TMA CREW TRANSPORT VEHICLE



## CLIPPER CREW SPACE VEHICLE



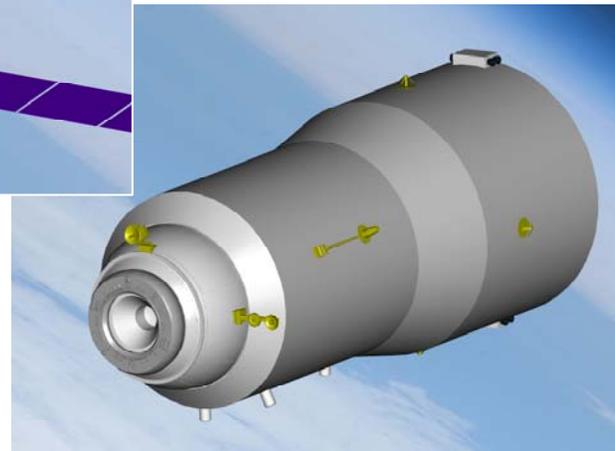
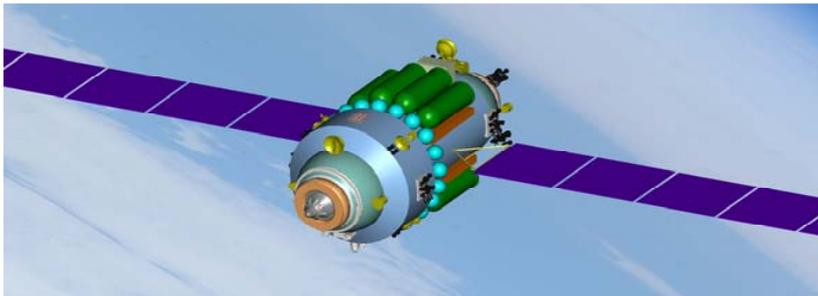
# CARGO TRANSPORT SYSTEM EVOLUTION: FROM PROGRESS M TO PAROM

## PROGRESS M CARGO TRANSPORT VEHICLE



PL DELIVERED MASS – 2.4 T

## PAROM CARGO TRANSPORT SYSTEM WITH CANISTER



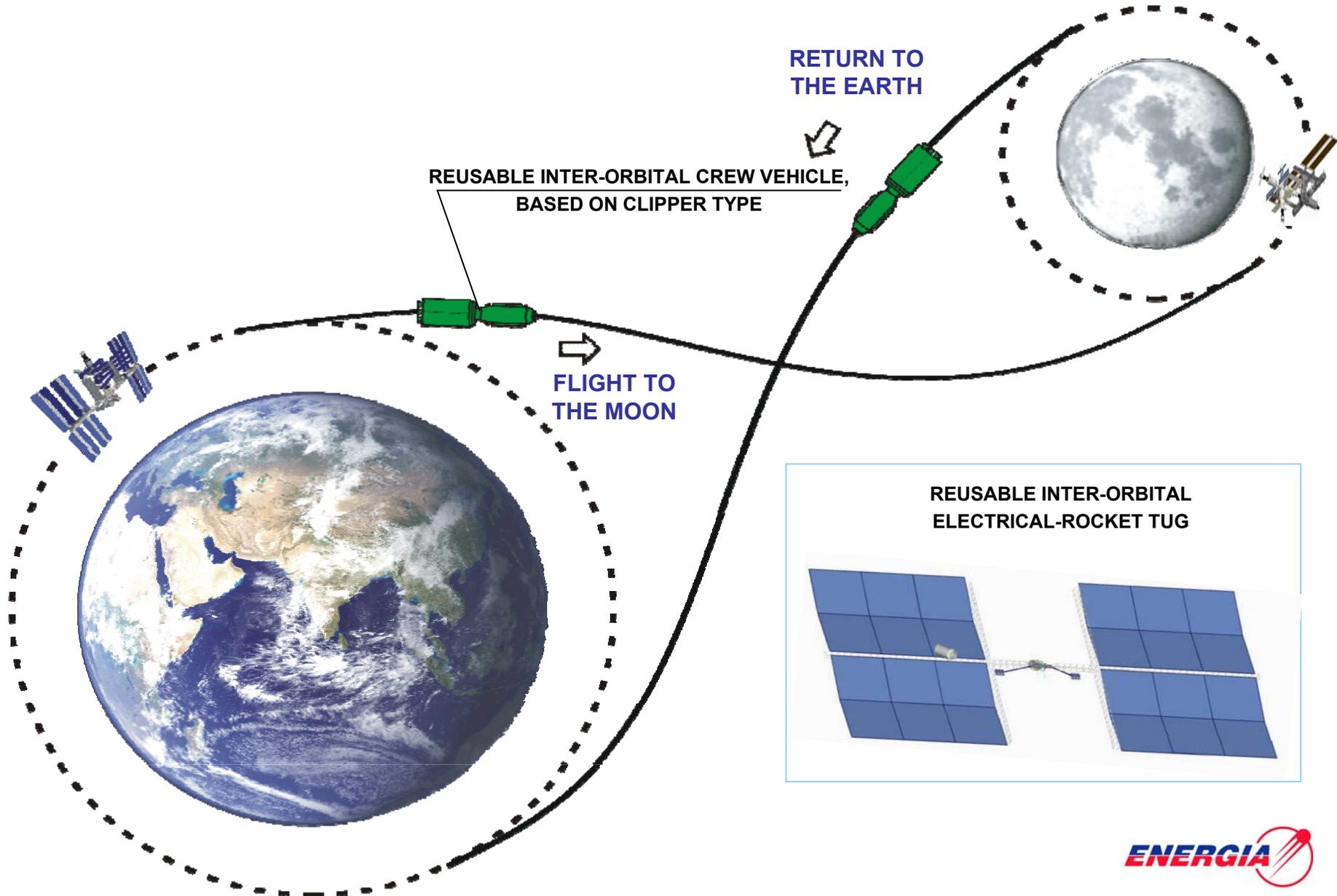
PL DELIVERED  
MASS – 7.6 T

## Step to Moon and Mars

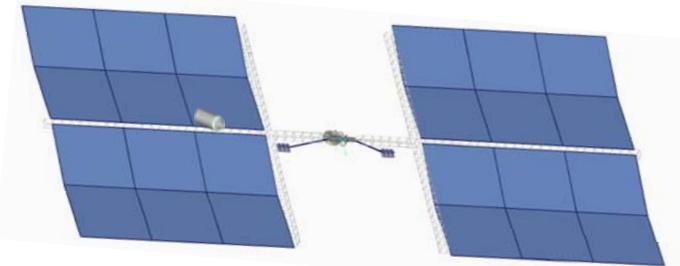
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- Reusable transportation systems for interorbital flights
- Space station near Moon and Mars
- Systems for planetary landing and takeoff

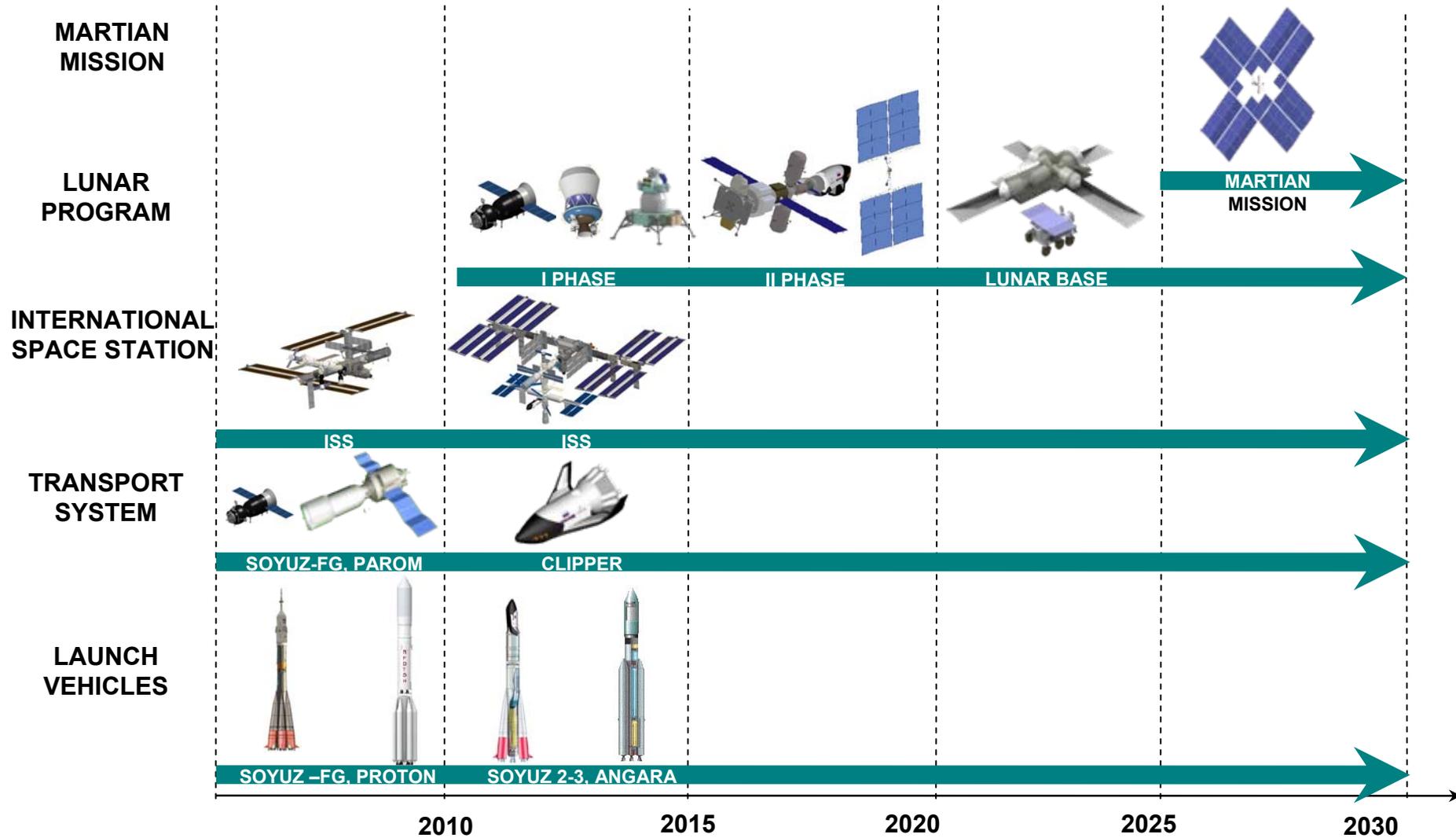
# DEVELOPMENT OF THE EARTH-TO-MOON REUSABLE TRANSPORT SYSTEM



**REUSABLE INTER-ORBITAL  
ELECTRICAL-ROCKET TUG**



# RSC ENERGIA PROPOSALS ON THE DEVELOPMENT OF HUMAN SPACE EXPLORATION



- Government support for new space technology
- Competition and international cooperation in technical development
- Reduction of political risk



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# Implementing the Vision

**Space Exploration Conference  
2006**