Disruptive propulsive technologies for European space missions

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Advanced space technologies has been reviewed and analysed in view of heavy interplanetary missions of interest for Europe and European industry capabilities.
Among the missions of interest :

- Heavy robotic missions to outer planets
- Asteroid deflection missions
- Interplanetary manned mission (at longer term).

These missions involve high speed increments, generally beyond the capability of chemical propulsion (except if gravitational swing-by can be used).
For missions beyond Mars orbit, the fission nuclear energy sources become competitive with solar panels.
Two electrical power levels have been considered : 30 kWe and 200 kWe.
The lowest power level (30 kWe) is more suited to surface energy source (Moon or Mars manned base) or to relatively small automatic platforms.
The 200 kW power level is more suited to heavy robotic missions, including efficient asteroid deflection.
NTP (Nuclear Thermal Propulsion) has been also considered, especially for asteroid deflection. NTP may be compatible with late detection acting by direct impact.
The public acceptance of these new technologies has been analysed, showing the necessity to provide safe ground testing facilities as well as a mission scenario excluding re-entry of an activated space nuclear reactor.

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