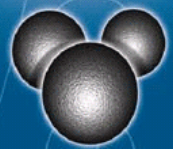
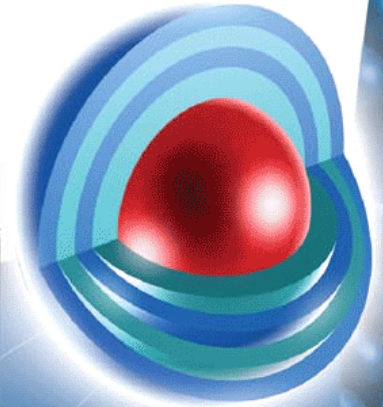
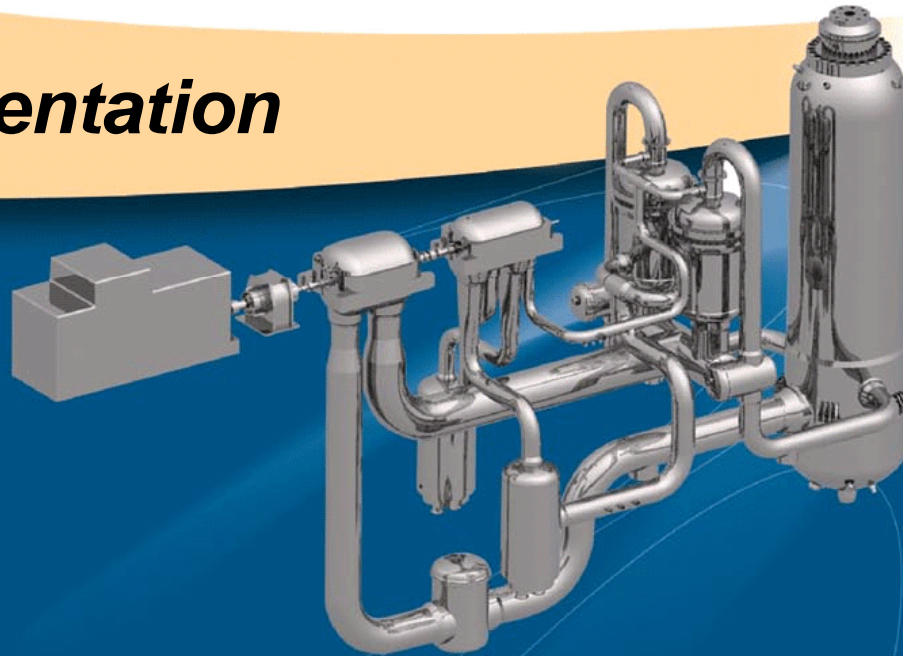
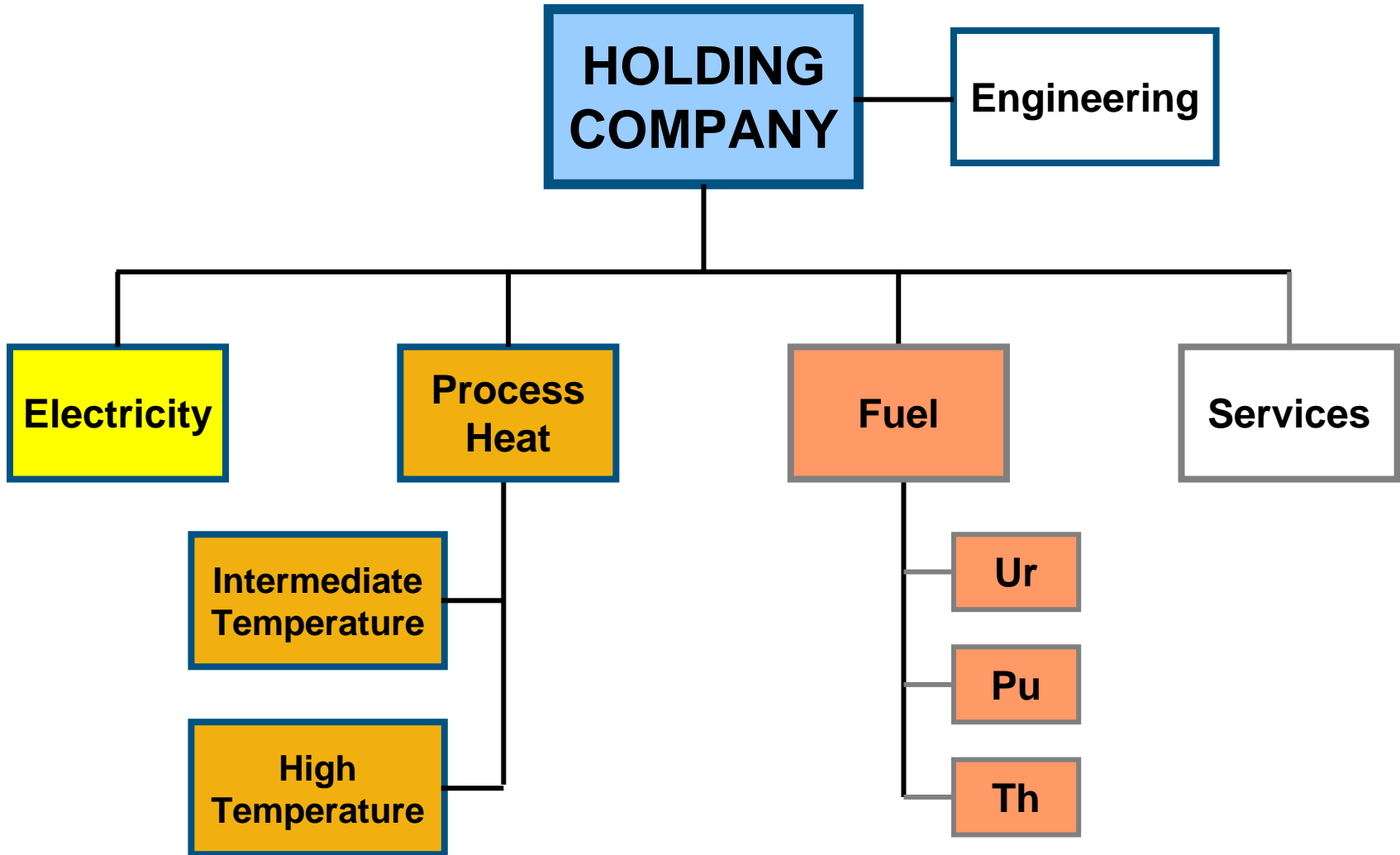




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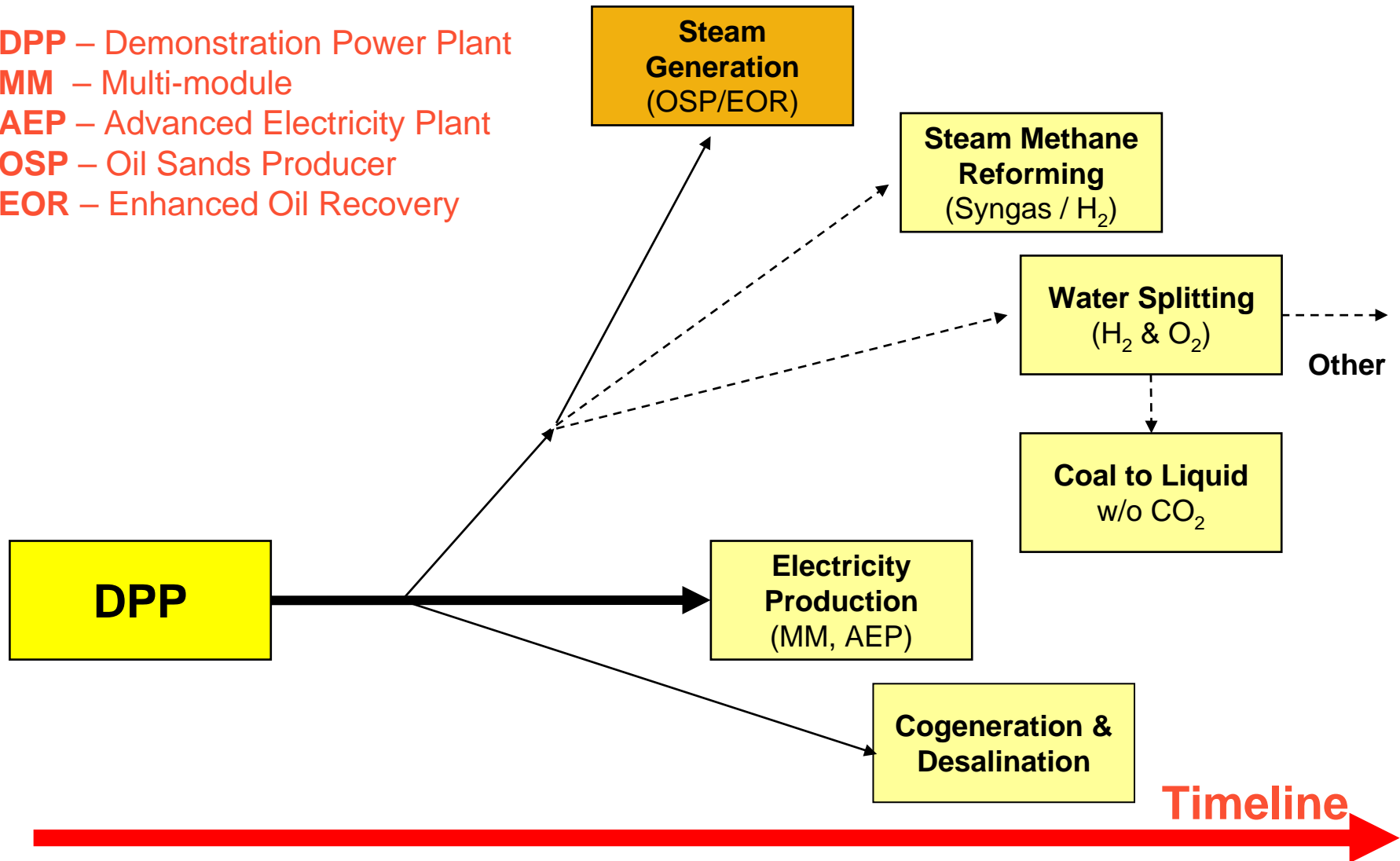
***Introduction of Nuclear Power
into Non-Nuclear States***



Product Development Path



- DPP** – Demonstration Power Plant
- MM** – Multi-module
- AEP** – Advanced Electricity Plant
- OSP** – Oil Sands Producer
- EOR** – Enhanced Oil Recovery





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New Market Access



- **All vendors including PBMR will have opportunities to enter new markets.**
- **In the interest of world to ensure safe, reliable and cost-effective nuclear environment for all countries.**
- **Many barriers to entry for currently non-nuclear states.**
- **In addition to energy provision, there are many development opportunities around the nuclear industry if done right.**
- **Suggest an “Enabling Framework” with a range of issues to be addressed.**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**
- **Finance**
- **Contract Management**
- **Training and Education**
- **Industrial Infrastructure**



Enabling Framework



Political Framework



Political Enabling Framework



- **Nuclear Policy framework approved by Government**
- **Signatory of the NPT (Nuclear Non-proliferation Treaty)**
- **Vendor-Government to Buyer-Government nuclear cooperation agreement**
- **Nuclear enabling legislation:**
 - **Safeguards**
 - **Security**
 - **Safety**



Political Enabling Framework



- **Public information and acceptance**
- **Limitation of nuclear liability**
- **Nuclear incentives programme**
- **Labour legislation**



Enabling Framework



- **Political Framework**
- **Responsible Owner**



Responsible Owner



- **Requires ownership of plant and fuel**
- **Operating within policy framework of the Government**
- **Management capability**
- **Financial and commercial capability to engage with vendor**
- **Equity finance to fund initial costs**



- **Undertake feasibility studies and prepare bankable business plan**
- **Site selection and ownership**
- **Submissions to all regulatory bodies done by and in name of Owner**
- **Off-take agreements:**
 - **Transmission infrastructure Owner**
 - **Cross borders where applicable**
 - **Pooling arrangements where applicable**
- **Effective communication infrastructure**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**



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Regulatory Framework



- **Electricity regulator**
- **Environmental regulator**
- **Nuclear regulator and regulatory policy and procedures**
- **Licensing process:**
 - **Pre-licensing or type certification**
 - **Acceptance of licensing from other countries?**
 - **Combined operating Licence**
 - **Site licensing process**
- **Inspection authority**
- **Safety regulations and emergency procedures**



Enabling Framework

- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**



Merchant Operator



- **Operator not necessarily the same as Owner. There are examples of international merchant operators that operate plants and systems on behalf of countries or utilities.**
- **Required nuclear operating experience**
- **Accept commissioning, operating and maintenance responsibility**
- **Able to accept nuclear liability within the Government's limitation of liability**
- **Able to train local operating staff**
- **Requires a safety culture**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**



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Fuel Supply and Waste Management



- **Nuclear Fuel supply agreement – with vendor or other supplier**
- **Nuclear transport policy and agreements with conveyer**
- **Waste management policy:**
 - **Once through**
 - **“Wait and see”**
 - **Temporary storage**
 - **Reprocessing**
 - **Deep geological storage**
- **Decommissioning policy**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**
- **Finance**



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Finance



- **Bankable Feasibility study**
- **Recognise the high initial capital cost of nuclear plants versus other technologies**
- **Financing of various phases:**
 - **Pre-construction phase**
 - **Site investigation**
 - **Feasibility studies**
 - **Training**
 - **Licensing Phase**
 - **Ordering of long-lead items**
 - **Construction phase**
 - **O&M Phase**
 - **Decommissioning fund**
 - **Local industrial capability**

- **Equity partners and debt financiers**
- **Insurance**
- **Export credit guarantees for vendors**
- **Support from Development Finance Institutions (DFI's) where possible**
- **Government participation - incentives**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**
- **Finance**
- **Contract Management**



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Contract Management



- **Compilation of User Requirement Specification (URS)**
- **Site selection process**
- **Compiling tender and tender adjudication**
- **Contract with vendor – type of contract (i.e. turnkey)**
- **Project Management capability - EPCM Contractor**
- **Establishing a supply chain**
- **Local labour and community involvement**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**
- **Finance**
- **Contract Management**
- **Training and Education**



- **Huge opportunity to provide skills and stimulate job opportunities**
- **Technology transfer arrangements**
- **Training institutions and structures to train engineers, operating personnel, artisans, inspectors, etc.**
- **Own Research and Development initiatives**
- **Construction staff**



Enabling Framework



- **Political Framework**
- **Responsible Owner**
- **Regulatory Framework**
- **Merchant Operator**
- **Fuel Supply and Waste Management**
- **Finance**
- **Contract Management**
- **Training and Education**
- **Industrial Infrastructure**



- **Utilisation of local skills and industrial base where it exists**
- **Localisation strategy where this is economically feasible**
 - **Unlikely to occur if there are only one or two reactors to be built.**
 - **Will require a development programme**
- **Industrial technology transfer**
- **Quality Assurance (QA) and Nuclear Certification**
- **Understanding Codes & Standards**

Localisation Strategy



**Industrial
Development**

**Technology
Transfer**

**Skills
Development**

**Quality
Assurance**

**Scientific &
Technological
Development**

2000

Industry & Technology Upgrade

2025

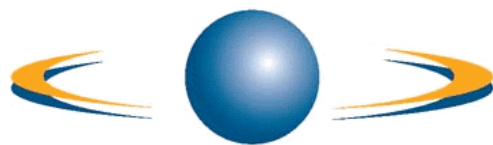
**Corporate
Development**

BEE

SMME

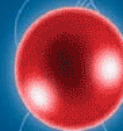
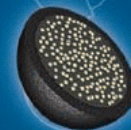
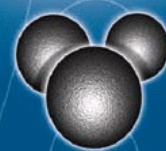
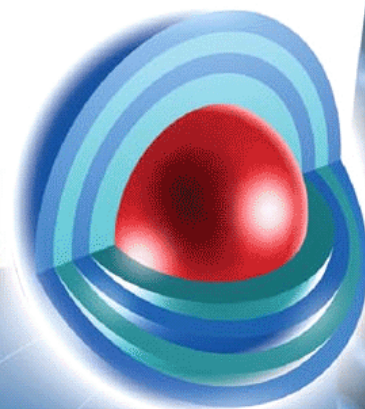
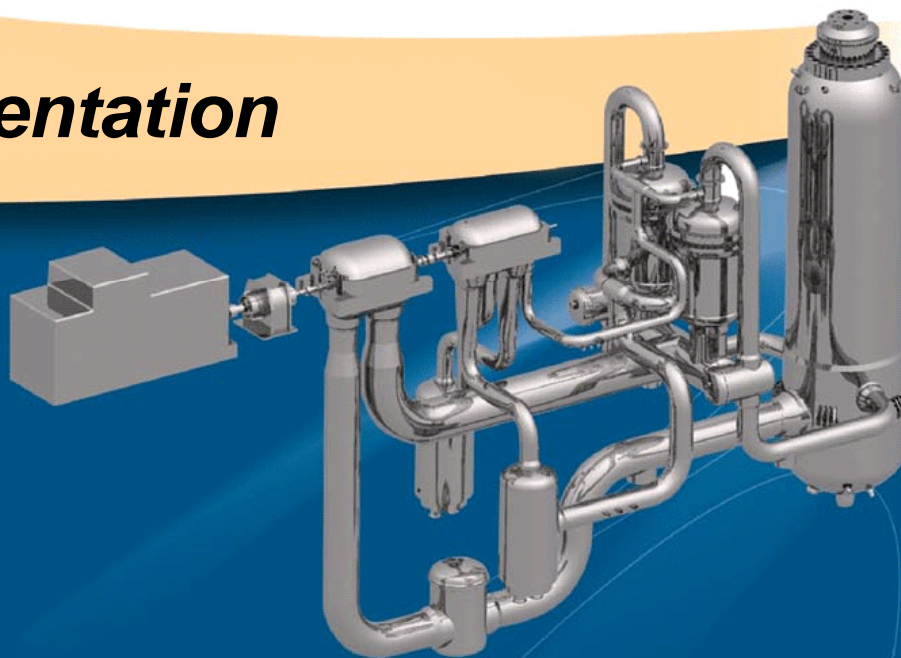
**Financial
Mechanisms**

**Government
Support
Mechanisms**



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WHAT CAN BE DONE?



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What can be done?



- **Realisation that the entire nuclear community must wrestle with these issues.**
- **New Governments cannot take the issue lightly. Weigh up the consequences.**
 - **Priority areas:**
 - **Enabling legislation**
 - **Public preparedness**
 - **Regulatory environment**
 - **Financial capability**
- **Energetic diplomatic activity required.**
 - **The “have” nations must realize the need and assist the “have-nots” to establish enabling frameworks**
- **International Development Institutions must make this their cause:**
 - **IAEA**
 - **DFIs (Development Finance Institutions)**



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What can be done?



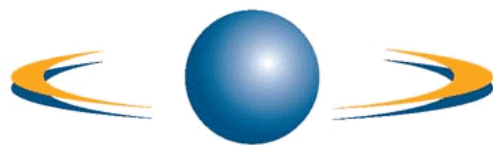
- **Learn from the experience of others.**
 - There are today 30+ States operating nuclear plants
 - All had to start somewhere.
- **Harmonise the regulatory environment (MDEP)**
- **Limitation of nuclear liability – insurance structure**
- **Cooperative programs especially in:**
 - Education and training.
 - Health and Safety training
 - Regulatory compliance and inspectorate training
 - Scholarships
 - Exchange programs
- **Business opportunities for consulting organisations:**
 - Preparing enabling legislation
 - Finance and Business plans



Objective

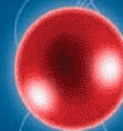
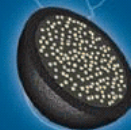
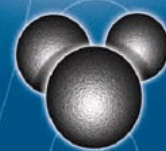
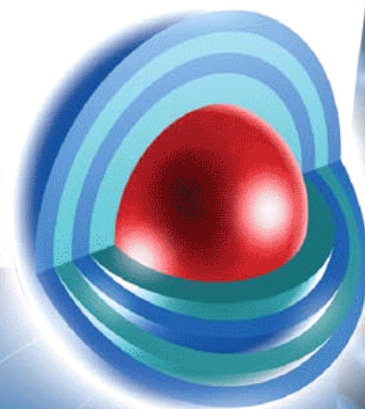
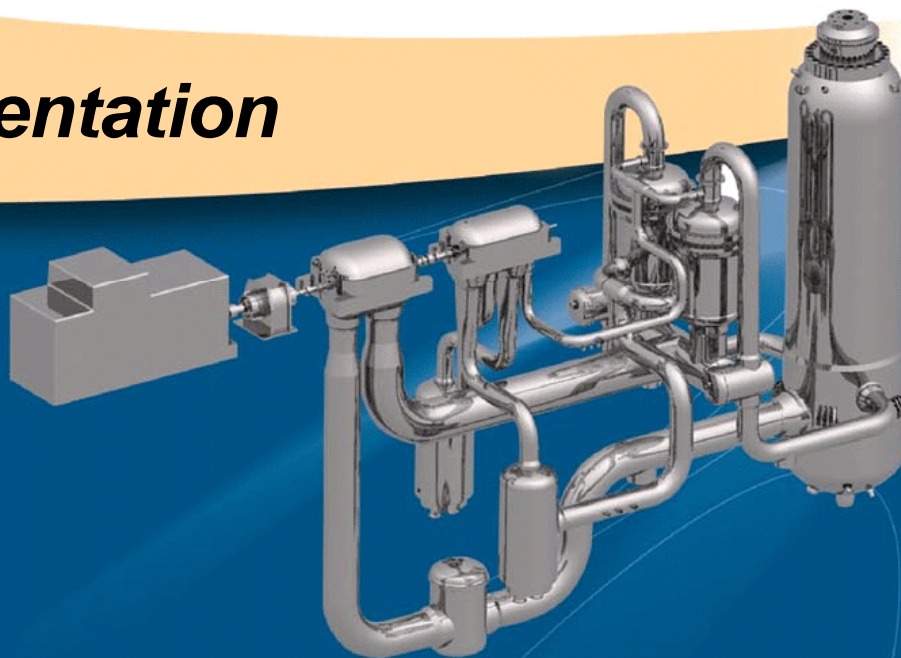


**To realize the objective of
ensuring safe and responsible
access to nuclear power for the
benefit of humanity and our
environment**



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THANK YOU