IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Local supply chain issues in Industrial Involvement

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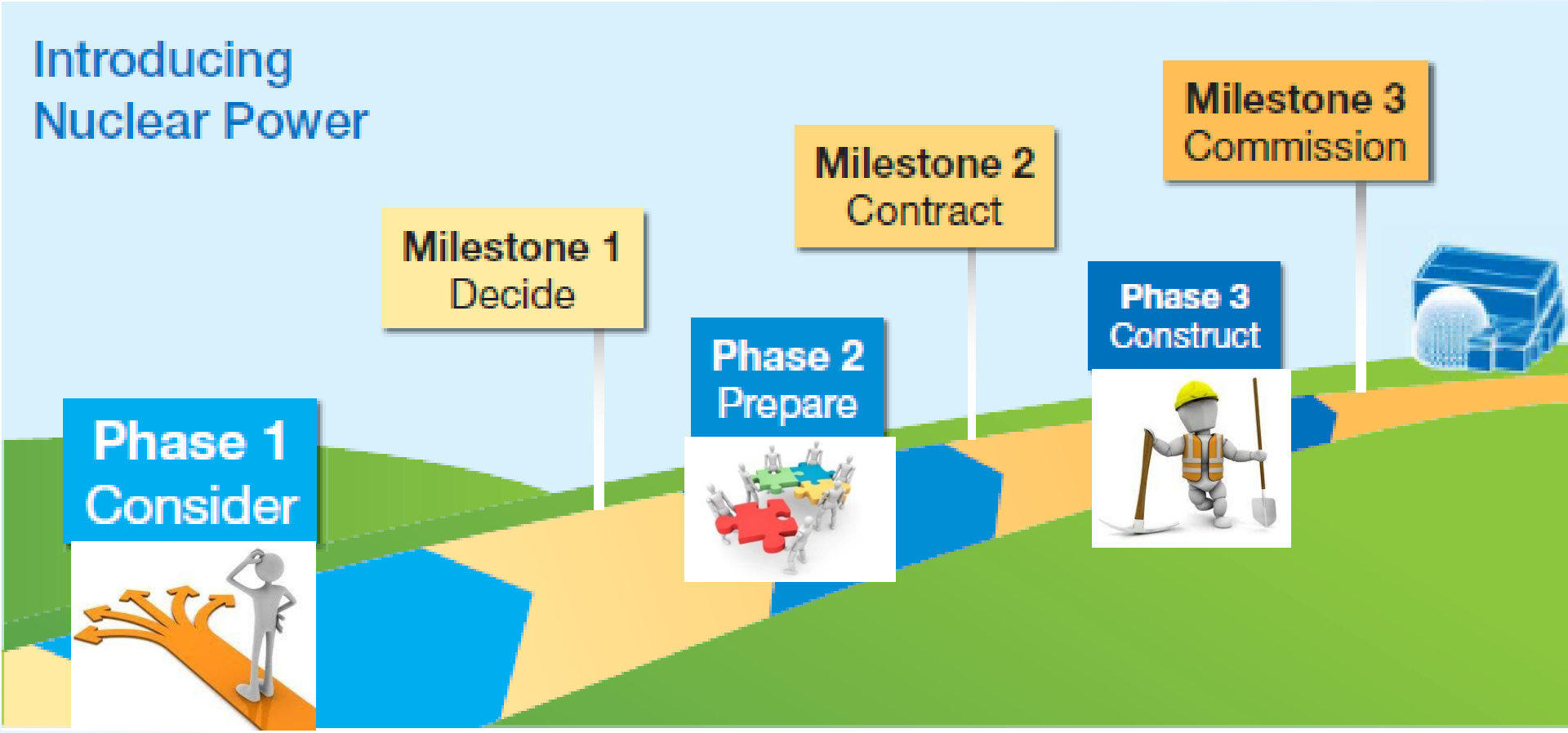
Nuclear Infrastructure Development Section
17 Oct 2018

IAEA Milestones Approach: Infrastructure Development Phases



⇒ Poland is now in “Phase 2”

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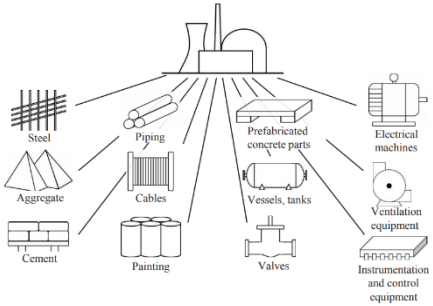
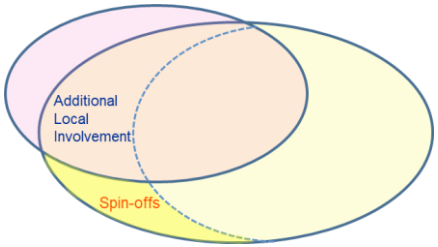
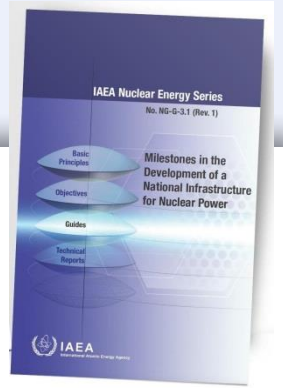
2. Supply Chain Issues



3. “Spin-offs” Potentials



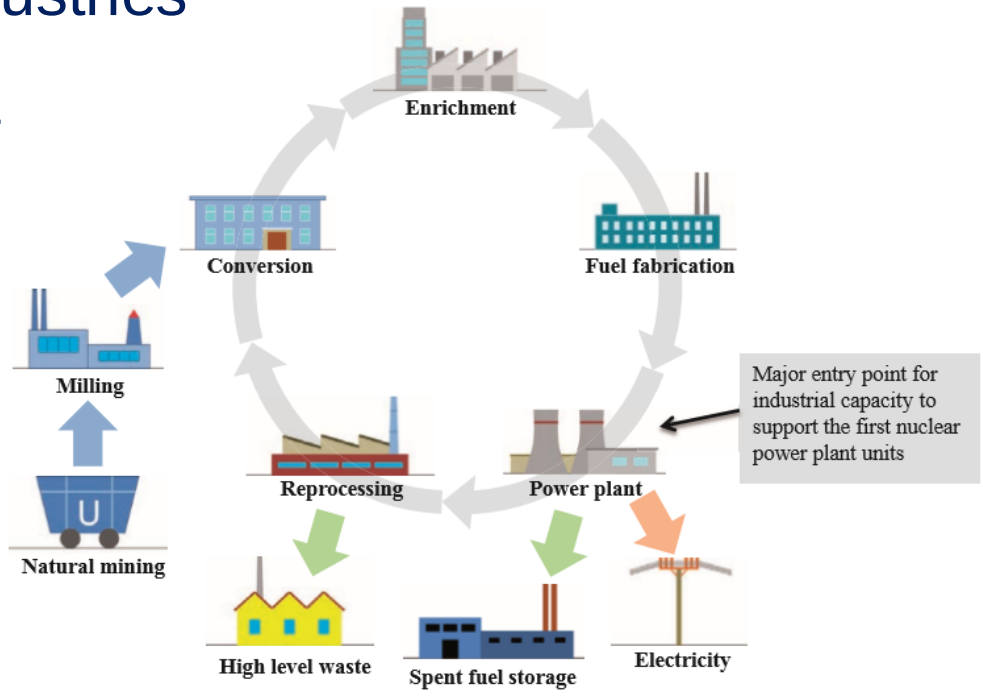
IAEA Milestones Approach: Infrastructure Issues



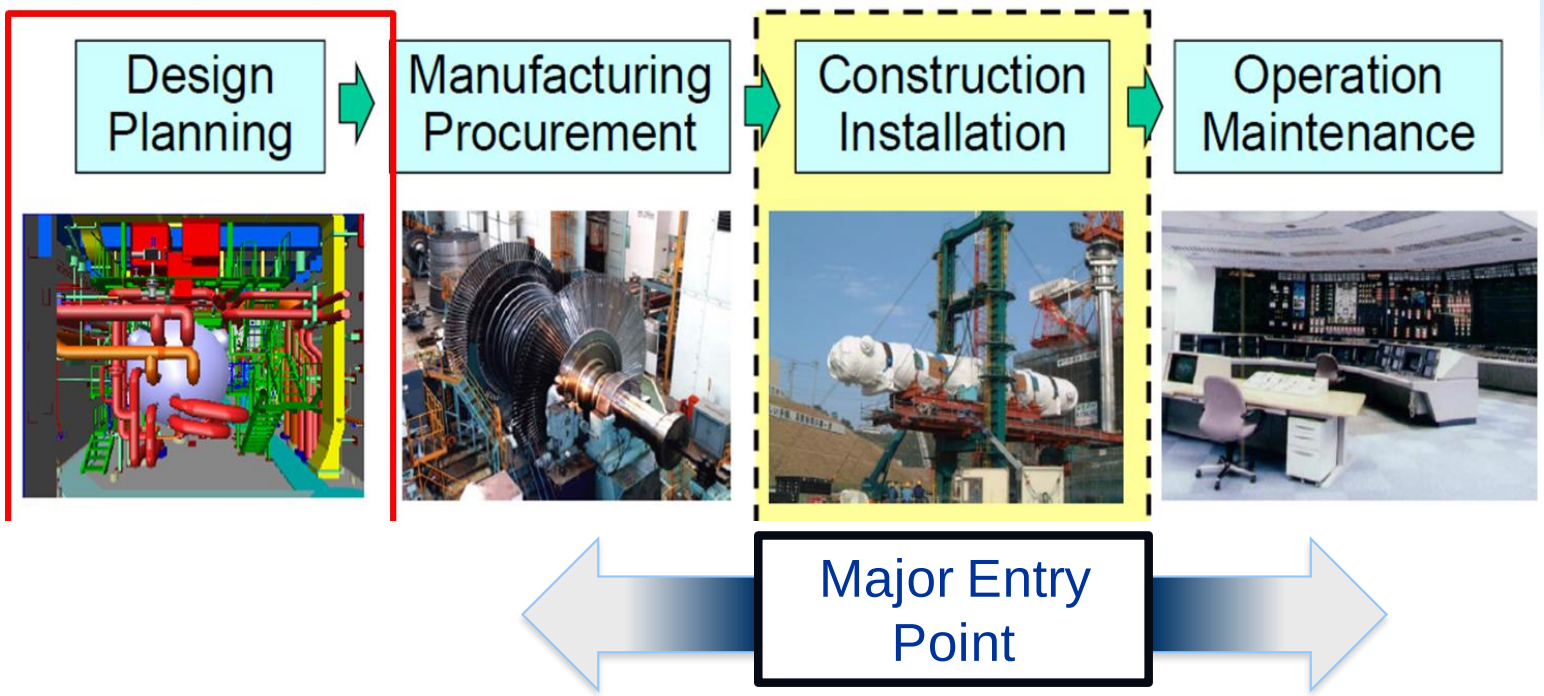
"Industrial Involvement" is one of the 19 infrastructure issues in Milestones Approach.

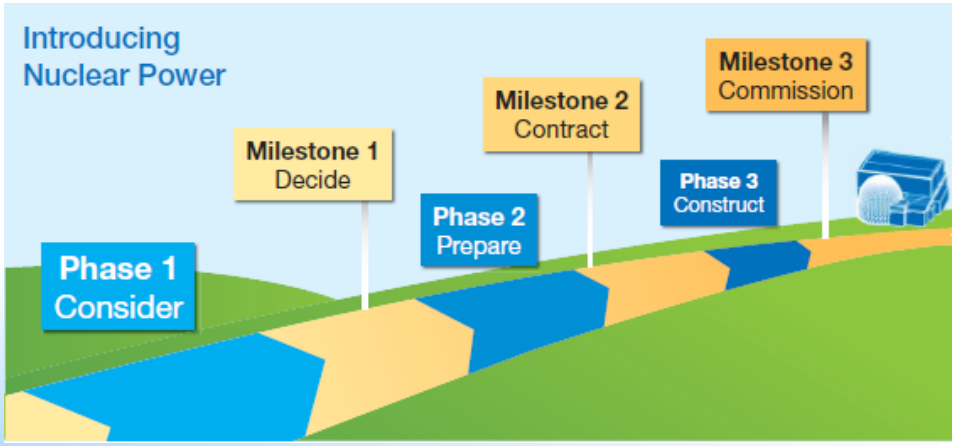
NPP Project and Industrial Involvement

- Expectation to NPP Project
  - Stable energy source
  - Development of local industries
  - Technology development
- NPP Project requires:
  - Advanced technology
  - High quality standards
  - Special material
  - Long-term schedules
  - Strict safety culture applied to supply chain overall



Industrial Involvement Needs Long-term Strategy





Benefits of Localization

- For **EPC Contractor**
  - Secure supply chain
  - Efficient employment
  - Effective logistics

- For **Government**
  - Job creation
  - Support to high skilled jobs
  - Impact on GDP growth

- For **Local Industries**
  - Technology transfer
  - Strengthen Partnerships
  - Access to world market for nuclear/non-nuclear areas

Industrial involvement : Phase 1 (Consider to Decide)

- NEPIO (Nuclear Energy Project Implementation Organization) to Assess;
  - Local industrial capabilities
  - Interest of business / industrial leaders in participating in the NPP project considering the special requirements
  - Investment for intended upgrading of industrial facilities
- NEPIO to Develop;
  - Short term and long term policies on the area/level of local participation that is practical and desired
- NEPIO to Initiate dialogue with potential vendor(s)

Industrial involvement : Phase 2 (Prepare to Contract)

- NEPIO to Consider;
  - Which local suppliers can reliably supply commodities, components and/or services.
  - Which upgrades in skills & capabilities are realistic in the time-frame required to support NPP construction.
- NEPIO to Determine;
  - Bid specification which should include information about domestic industry capabilities & requirements related to technology transfer.
- NEPIO to Implement policy regarding capacity building, incentives, etc.

Industrial involvement : Phase 3 (Construct to Commission)

- NEPIO to Implement;
  - Industrial Involvement Policy continuously
- Owner/Operator to Conduct;
  - Reassessment of the supply sources to support operation
- Local manufacturers to Obtain
  - Necessary qualification for not only construction but also operational support by Owner/Operator

Poland in "Phase 2" – so far so good

- **Objective** – Clarified
  - ✓ 30% at first stage, up to 60% to be localized
- **Gap Analysis** – Conducted
  - ✓ 59 companies with nuclear experience in 10 years
  - ✓ ≃ 400 potential companies are identified
- **Capacity Building** – Ongoing
  - ✓ Ministry of Energy leads activities (e.g. tech workshop, manual, trade mission, supplier forum)
- **Preparation for Bidding** – TBD

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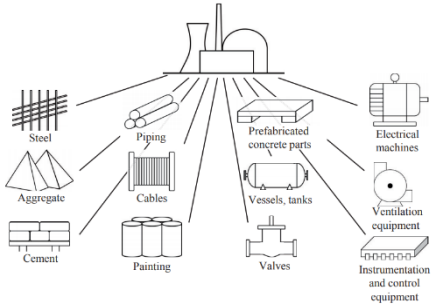

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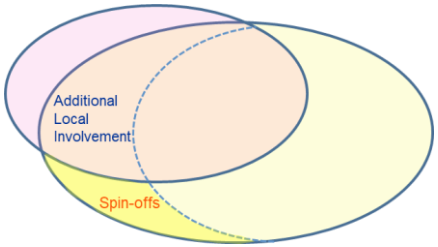
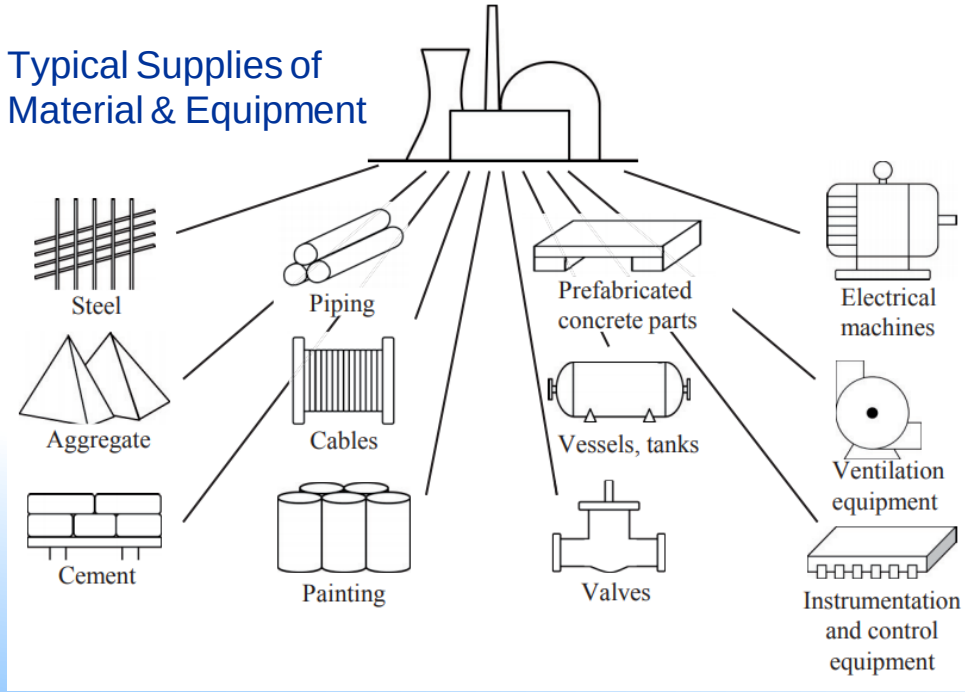
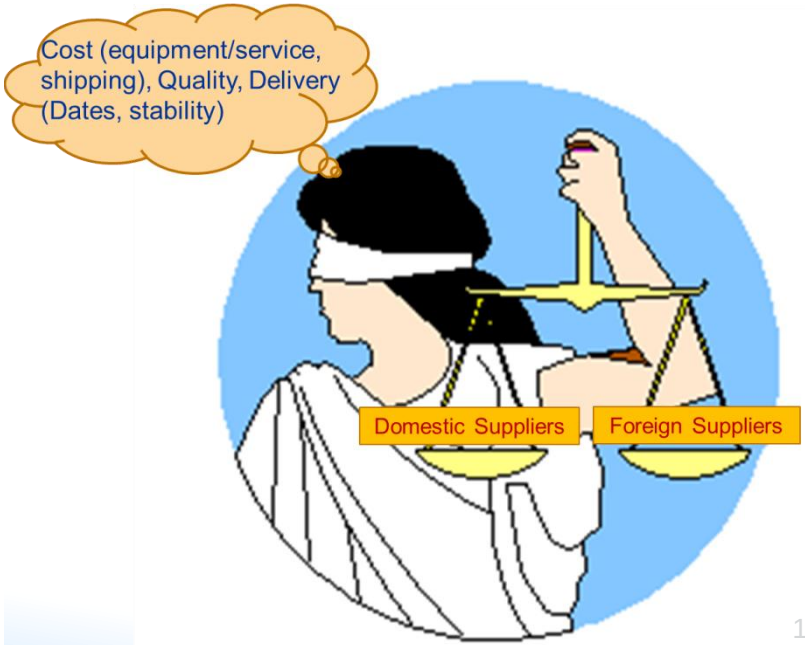


Supply Chain and Partnerships

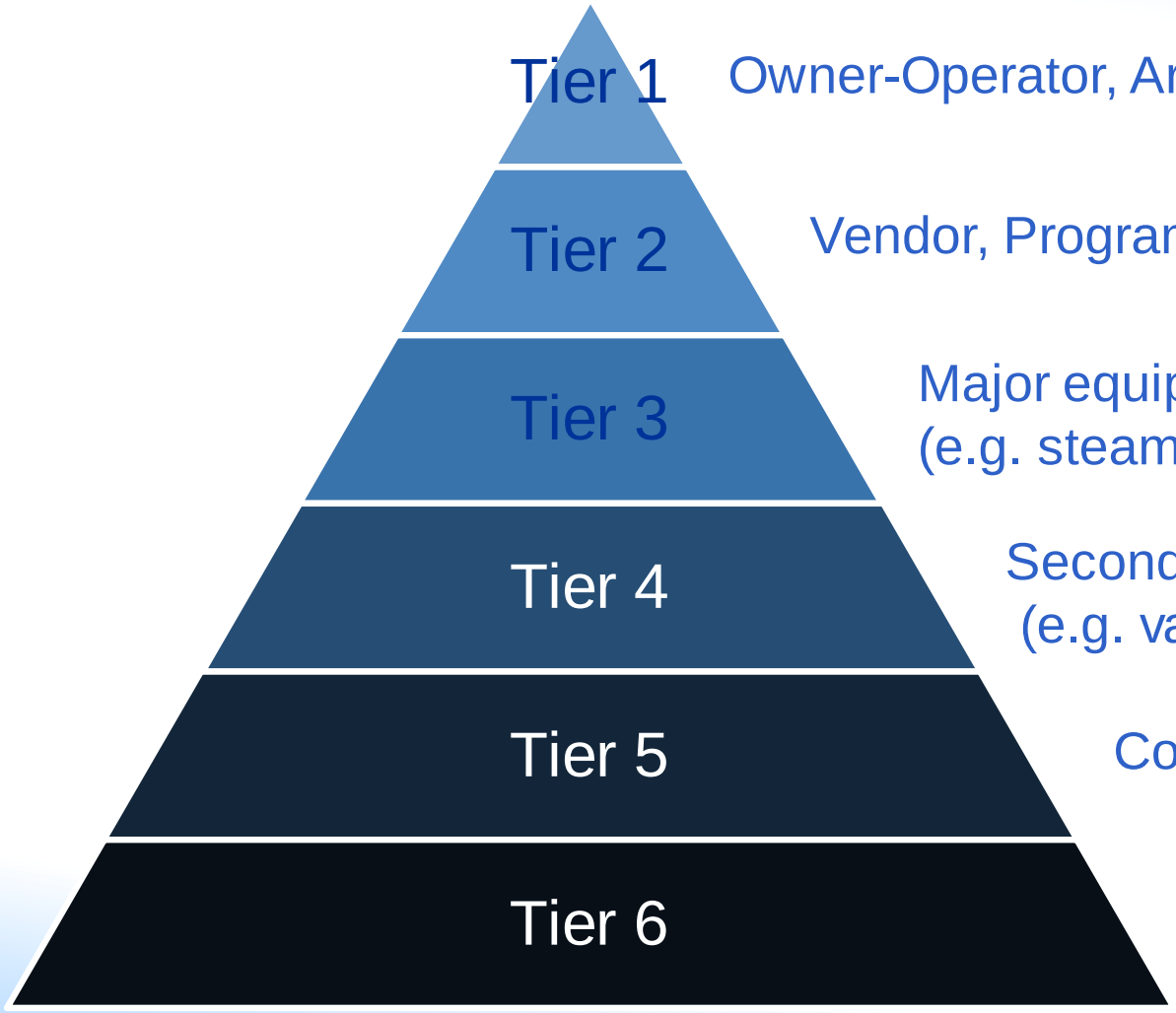
- For the **First NPP Project**,
  - Supply Chain is created by EPC contractor (with inputs & supports from owner/operator), usually in Phase 3.
  - After construction, owner/operator will take over some aspects of the supply chain from the EPC contractor.

Typical Supplies of Material & Equipment





Graduation of Suppliers in new NPP



Owner-Operator, Architect Engineer

Vendor, Program & Procurement Manager

Major equipment suppliers
(e.g. steam generators, turbines)

Secondary equipment suppliers
(e.g. valves, pumps)

Component suppliers

Raw materials, primary components & services

Supply Chain Issues (1) (seen from subcontractors/suppliers)

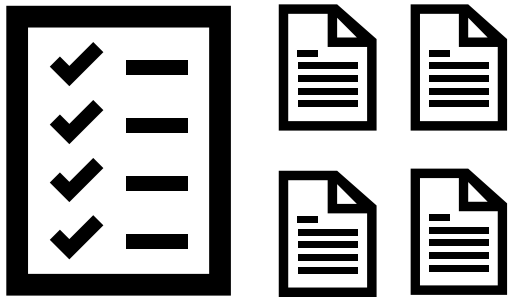
- Similar sectors' experience (e.g. petrochemical) helps you, but NOT automatically applicable to nuclear industry.
- Sometimes the highest barrier to entry is "culture" rather than "technology". (it may take years to master QA/QM practice after months formal trainings, especially for a SME of craftmanship)
- It'd be critical to understand potential vendors' policies in your battlefield such as:
  1) **Threshold of "In-house" or "Outsourcing"** (note: it'd be different by parts even in the same tech-field like welding)
  2) **Priorities of suppliers' condition** (Financial stability first? "ISO9001"-holder? Potential Management Skills or simply cost?)

Supply Chain Issues (2)
(seen from subcontractors/suppliers)

- It'd be critical to estimate long-term "Investment & Return" scenarios in your battlefield. The factors may include:
  1) **Continuity of orders** (Construction? O&M?)
  2) **Geography of NPPs** (Inside/outside of Poland?)
  3) **Scale of Development** (Machinery? Documents? HR?)

⇒ A Case: documents to apply a certified supplier (example)

- ✓ Manual to satisfy quality requirement surely
- ✓ Operational guideline in detail
- ✓ Track record of manufacturing
- ✓ List of Equipment/Staff/Procurement
- ✓ Financial portfolio



Suggestions to be provided gently… (1)

- Before selecting a vendor, launch/drive ad-hoc group(s) focusing on Codes & Standards (C&S) issues such as:
  1) Studies for C&S management cases in other countries
  2) Establish/revise C&S adjusted to Polish circumstances

- Before starting bidding process, launch mission group(s) to interview with skillful vendors and/or Tier2+ suppliers in each field Polish industry targets on. Topics may involve:
  1) QA/QM system (e.g. work allocation, documentation method, inspection period, communication with sub-suppliers)
  2) Threshold of “In-house” or “Outsourcing”
  3) Ideal Suppliers condition with priorities

Suggestions to be provided gently… (2)

- (mainly to NEPIO) through the process of "Gap-Analysis" on local industry, doing cost-effective analysis on each policy option such as:
  1) Financial Incentive (e.g. low-interest loan)
  2) Direct subsidies for machinery investments
  3) Indirect subsidies for knowledge building (e.g. missions)
  4) Mid/Long-term national plan for NPPs

- (mainly to companies) through proactive participating in NEPIO/governments' activities noted above, to prepare "Investment & Return" scenarios in each business area.

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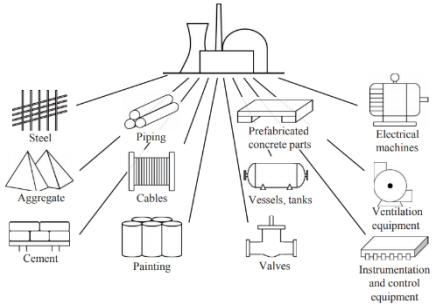

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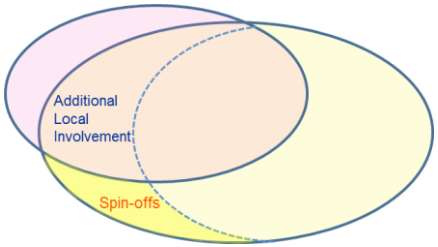
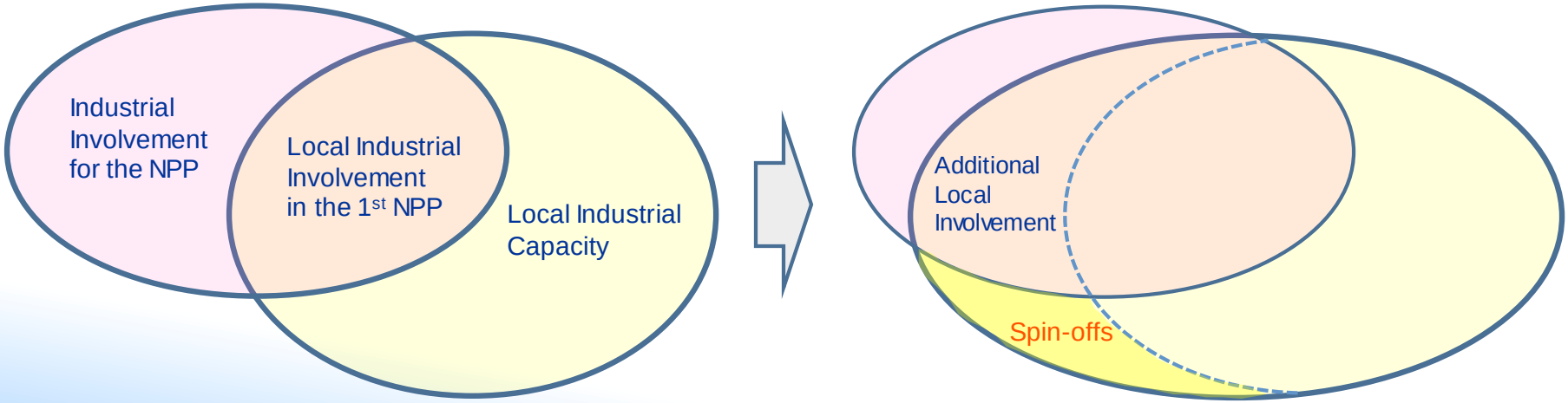


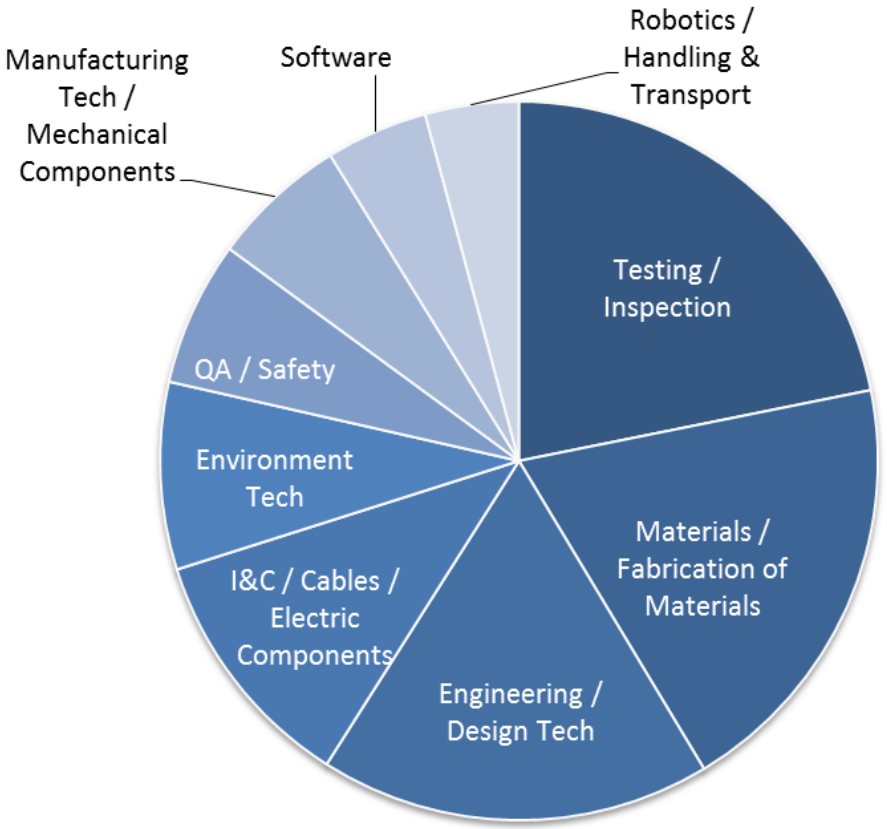
“Spin-offs” borne by the NPP Projects

- “Local Industrial Involvement” can expand as NPPs mature.
- This expansion will depend on several factors such as Government Policies, the # of NPP, and TT Agreements.
- There can be “Spin-offs” through participation in the NPP.

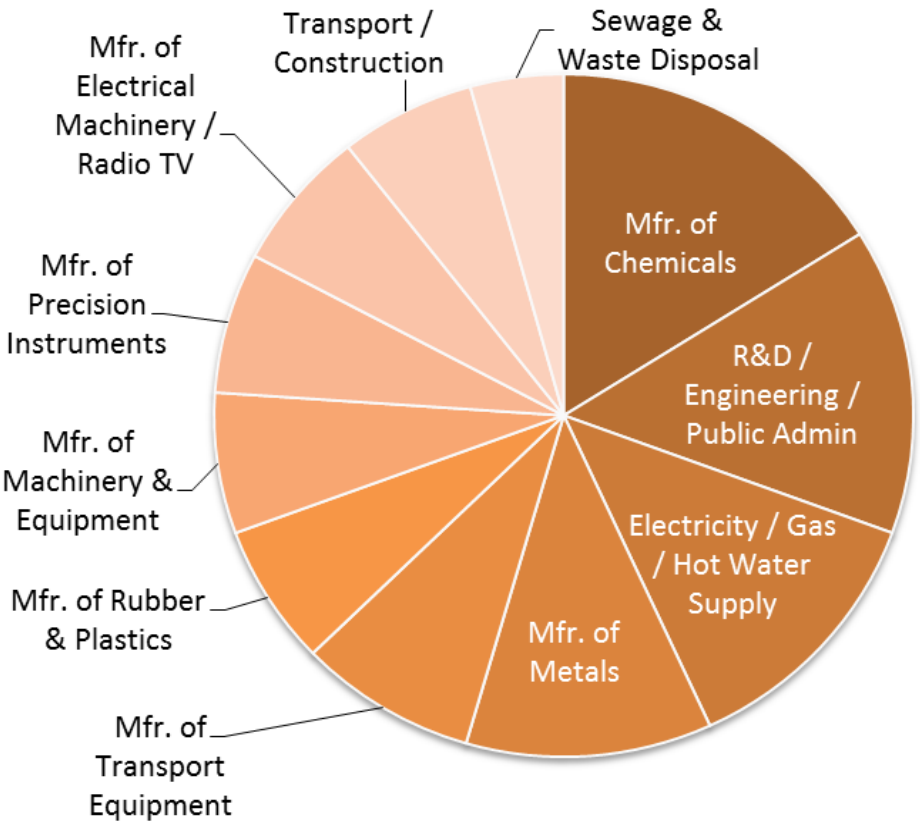


“Spin-offs”: Technology and Target Industry

Category of Technology (n = 261)



Target Industry (n = 255)

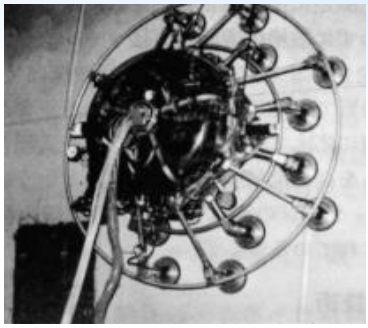


Ref. OECD/NEA “Spin-off Technologies Developed Through Nuclear Activities” (1993)

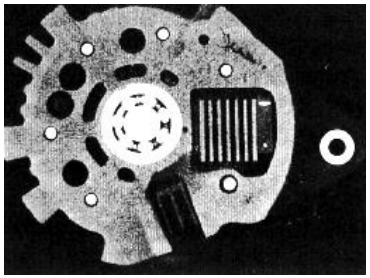
* Only items represented by more than 10 cases noted in this chart.

Examples of Techs applied to Other Industries

- **Seismic Response Technology**: can be used in base isolated foundations for buildings
- **Remote Controlled Inspection Technology**: can be used in the maintenance of ships
- **Non-destructive Inspection Technology** (e.g. X-ray, Acoustic and Associated Imaging): can be used in non-nuclear plants
- **Laser Technology** (e.g. For Improving Residual Stress): can be used in automobile, aviation and other manufacturers



Inspection Robot for Spherical Gas Holder

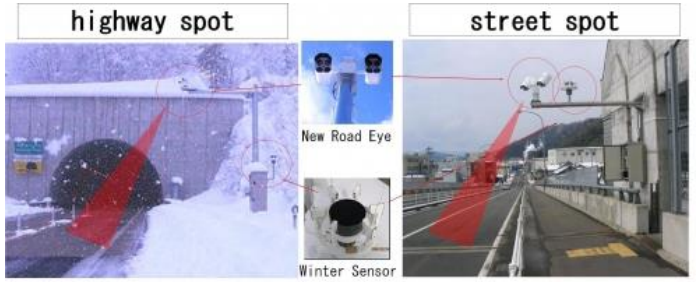


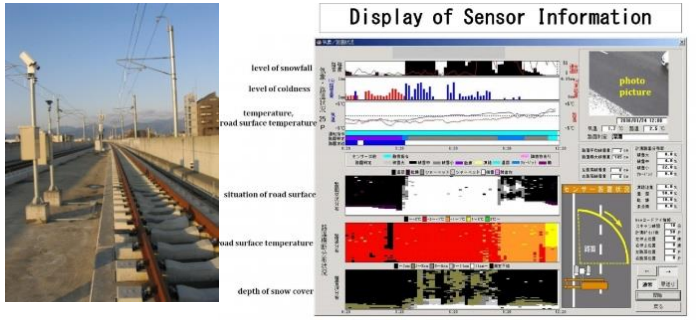
Imaging by X-Ray Computed Tomography

Source: Oka, Y. et al, "Application of Nuclear Power Technology to Other Industry" (1997)

A Case of Spin-offs: RR to a Small Company

- A road surface sensor improved its accuracy of snow determination by anomaly detection technology in a nuclear Research Reactor.
- An owner of the reactor (national R&D organization) allowed a small company (manufacturer of sensor) to use the patent.
- It was a case under the government policy to encourage “Spin-offs” from nuclear to non-nuclear industry.





Source: Yamada Giken
http://www.yamada-giken.co.jp/index.php?gid=912&kiji_id=65

Tips for Successful “Spin-offs”

- Spin-offs are basically occasional. The ways of generation range from “spontaneous” to “organized”.
- Spin-offs themselves are not unique to the nuclear industry: it can be insightful to look through “better practices” from other industries and/or other countries.
- Spin-offs policies should consider basic issues such as:
  - Understanding the target industry sector and the way it works.
  - Carefully assessing technical, economic or market applicability.
  - The field of application needs to be defined as tightly as possible.

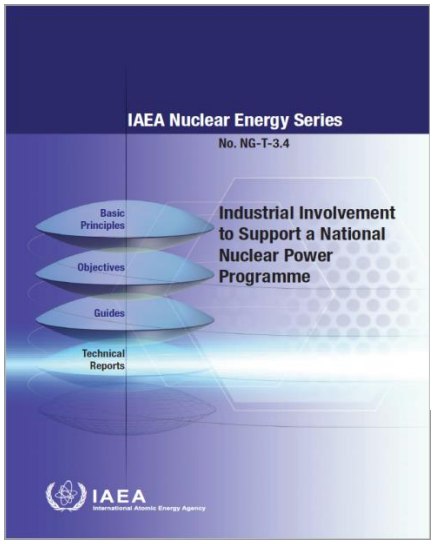
IAEA Supports in Industrial Involvement

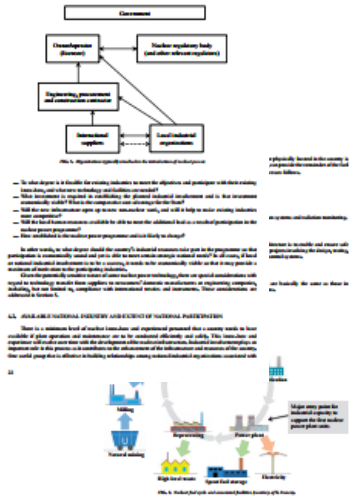
- Industrial involvement highly depends on the circumstance of each receiving country. ⇒ There is no silver bullet.
- IAEA assistance on Industrial Involvement

Sharing Knowledge and Experience

- Technical Meeting in France and China (2013, 2014), and Korea (2017)
- Training Course in France (2014, 2016)
- National Workshop (Ghana, Turkey, Egypt, etc)

Publishing Tech Documents





"Industrial Involvement to Support a National Nuclear Power Program", IAEA Nuclear Energy Series No. NG-T-3.4 (2016)

For Your Reference…

Industrial Involvement to Support a National Nuclear Power Program (IAEA, 2016)

https://www-pub.iaea.org/books/iaeabooks/10825/Industrial-Involvement-to-Support-a-National-Nuclear-Power-Programme

Facilities to support a NPP / Factors affecting the development of local Industrial Involvement / Technology Transfer and Intellectual Property / etc

Procurement Engineering and Supply Chain Guidelines in Support of Operation and Maintenance of Nuclear Facilities (IAEA, 2016)

https://www-pub.iaea.org/books/iaeabooks/10865/procurement-engineering-and-supply-chain-guidelines-in-support-of-operation-and-maintenance-of-nuclear-facilities

Managing Procurement / Procurement Process (e.g., Potential procurement scenarios & supplier selection) / Considerations & Lessons Learned / etc

Leadership and Management for Safety (IAEA, 2016)

https://www-pub.iaea.org/books/iaeabooks/11070/Leadership-and-Management-for-Safety

Responsibility for Safety / Management for Safety / Culture for Safety / etc

- A new IAEA Technical Document in the area of **quality assurance and control** is planned and to be presented/discussed in the TM (12-15th Nov 2018, Vienna)

Dziękuję! (Thank you)

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Contact me, in any issue, as you like.