

Identifying the Environmentally Beneficial Attributes of Nuclear Energy

*Presentation to the
International Atomic Energy Agency
Scientific Forum
September 28, 1999*

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Why are Environmental Attributes of Energy Important?

- Environmental protection is part of the value system used for decisionmaking
- Environmental protection laws materially affect the electric generation industry in developed countries
- Energy delivery systems that minimize impacts are critical to sustainable development



What do Positive Environmental Attributes do for Nuclear Energy?

- Enhance public acceptance of nuclear energy
- Influence political systems to respond to industry needs
- Obtain economic return in environmental markets
- Protect access to electricity markets under restructuring
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How can Environmental Attributes be Comparatively Measured?

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- Valuation of externalities (e.g., ExternE)
- Lifecycle Inventory (e.g., IAEA publications)
- Quantitative risk comparisons
- Environmental Impact Statement (EIS)
- Lifecycle Impact Analysis or LCIA (ISO/DIS 14042)
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Lifecycle Analysis of Electricity Generation Facilities

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- Nuclear is the only generation source held accountable for lifecycle activities
- Positive attributes of nuclear overshadowed by perceived negatives
- No system for measuring impacts from other generation sources
- Green marketing requires defensible determination of impacts
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Lifecycle Analysis of Electricity Generation Facilities

Elements of Analysis

- Selection of impact categories, category indicators, and models
- Calculation of category indicator results (Characterization)
- Assignment of lifecycle inventory results (Classification)
- Relation of category indicators to a reference value (Normalization)
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Lifecycle Analysis of Electricity Generation Facilities

Impact Categories Used in the United States

- Resource Depletion
- Emission Loading
- Hazardous Waste
- Physical Disruption

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Lifecycle Analysis of Electricity Generation Facilities

Issues

- Impact categories and indicators difficult to determine for radioactive material
- Data limited for development of a comparative hazardous waste indicator
- Raw material (fuel) extraction occurring in areas with limited inventory data
- Reference values difficult to identify for individual plants

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Lifecycle Analysis of Electricity Generation Facilities

Conclusions

- LCIA must be further developed to analyze a complex system such as nuclear energy production
- Some usable version of LCIA is important to support nuclear policy positions



Lifecycle Analysis of Electricity Generation Facilities

Conclusions (cont'd)

- LCI, EIS, and quantitative risk analysis remain important tools to show positive nuclear environmental attributes
- Adequate information about environmental attributes of nuclear energy currently exists to support policies on air quality protection and sustainable development

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