

Design of a Thorium Extraction Process from Monazite Sand
(Technical Report)

Nuclear Expansion: The Debate Surrounding America's Energy Future
(STS Research Paper)

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by

Karl Westendorff

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Preface

As the consequences of global climate change become more apparent, the United States and other world leaders must take action to reduce their carbon footprints. How can the U.S. generate sufficient, safe, and sustainable energy for the future?

Nuclear power plants are carbon-neutral energy producers. Thorium nuclear fuels are an attractive alternative to their uranium counterparts because of their higher natural abundance and safer disposal options. A continuous process to extract thorium from monazite sands and convert it to its oxide at a nuclear fuel grade purity (>92 %) is described with the aim of making safer nuclear fuels more accessible. The proposed design consists of thorium isolation, thorium purification, and thorium oxide formation blocks, and produces 112 kg of thorium oxide daily. Economic analyses indicate the plant is profitable at its designed scale.

The debate surrounding nuclear power's use in the U.S. will influence whether nuclear power becomes a major contributor to America's energy future. Environmentalists on both sides of the debate selectively choose timescales to further their agendas when discussing nuclear power's environmental effects, safety, and economics. Timescale choices are often strongly correlated to the nuclear power debate's aspect and the participant group's side. The flexible use of timescales may be driven by the identities of environmentalist groups, the lack of clear timescales of concerns within participant groups, or because participant groups implicitly consider all timescales to be relevant. All these considerations are driven by an unclear definition of what environmentalism's timescale is in the nuclear power debate.

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