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Decommissioning of Extensive Production Facilities as Planned Architectural Opportunity for Ex-post Valorization

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DASP YEARBOOK 2025

ENVIRONMENTS

Editors
Valentina Burgassi
Valerio Della Scala
Elena Guidetti
Sofia Nannini

Editorial coordination and graphic layout
Lorenzo Murru
Simone Parola

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Politecnico di Torino
Dipartimento di Architettura e Design

DASP YEARBOOK 2025

ENVIRONMENTS

PhD in Architecture.
History and Project

DAD | Department of Architecture and Design
Politecnico di Torino

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40th

CYCLE

Decommissioning of Extensive Production Facilities as Planned Architectural Opportunity for Ex-post Valorization

Simone Parola

Cycle	40th
Supervisors	Elena Vigliocco
Research Group	FULL

Captions

Figure 1 - Drawing of planned obsolescence ratios/possibilities offered by decommissioning: City - Industry - Nuclear Power Plant, by the author, 2025.

Figure 2 - Schemes of World Nuclear Reactors, data source: IAEA International Atomic Energy Agency, 2025 and WNA - World Nuclear Association, by the author, 2025.

Sources

Calder, B. (2022). *Architettura ed energia: dalla preistoria all'emergenza climatica*. Einaudi.

Croce, G. (2022). *De-Sign: Architectural Subtraction in Times of Crisis*. Università di Trieste

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How can architectural design positivize planned obsolescence principles by exploiting the nuclear factory case as a paradigmatic model of complete subtraction-decommissioning design?

Architecture is commonly understood as the outcome of an additive transformation. Transformative actions always involve subtractions - of materials and/or meanings. However, any narrative connected to the architectural project privileges addition by focusing on the reasons, methods and/or effects produced by the additions. The considerable literature on restoration and adaptive reuse proves the efforts to legitimize and preserve the existing.

Let us use a metaphor. George Perec's 1976 essay "Notes brèves sur l'art et la manière de ranger ses livres" aims to state that the space and order of books is never sufficient. The former is because it is limited, and the latter is because it mutates according to needs that change over time. The library's "resistance to change" acts on the "persistence" and "obsolescence" of its structure, determining stable or temporary classifications.

The ability to adapt within certain limits is what characterizes Perec's library. So is architecture. However, climate change questions the perspective applied to architecture. Subtraction, therefore, becomes an interesting perspective to examine, starting from the effects it produces when applied. In the infinite catalogue of architectural artefacts, those that are most under pressure today are those that suffer from technological obsolescence.

In this framework, Nuclear Power Plant (NPP) decommissioning is placed. Many nuclear factories have been built worldwide after the Second World War, and in 1958, the Nuclear Energy Agency (NEA) was founded. For safety reasons, the NEA establishes that the life cycle of nuclear power plants must be planned from the beginning to achieve decommissioning. For this reason, nuclear factories are an exception in architecture because they escape patrimonialization. While a large amount of literature exists on other productive buildings regarding adaptive reuse, the case study of NPP is neglected for many reasons, including prejudice, collective emotional removal, and lack and inaccessibility of sources.

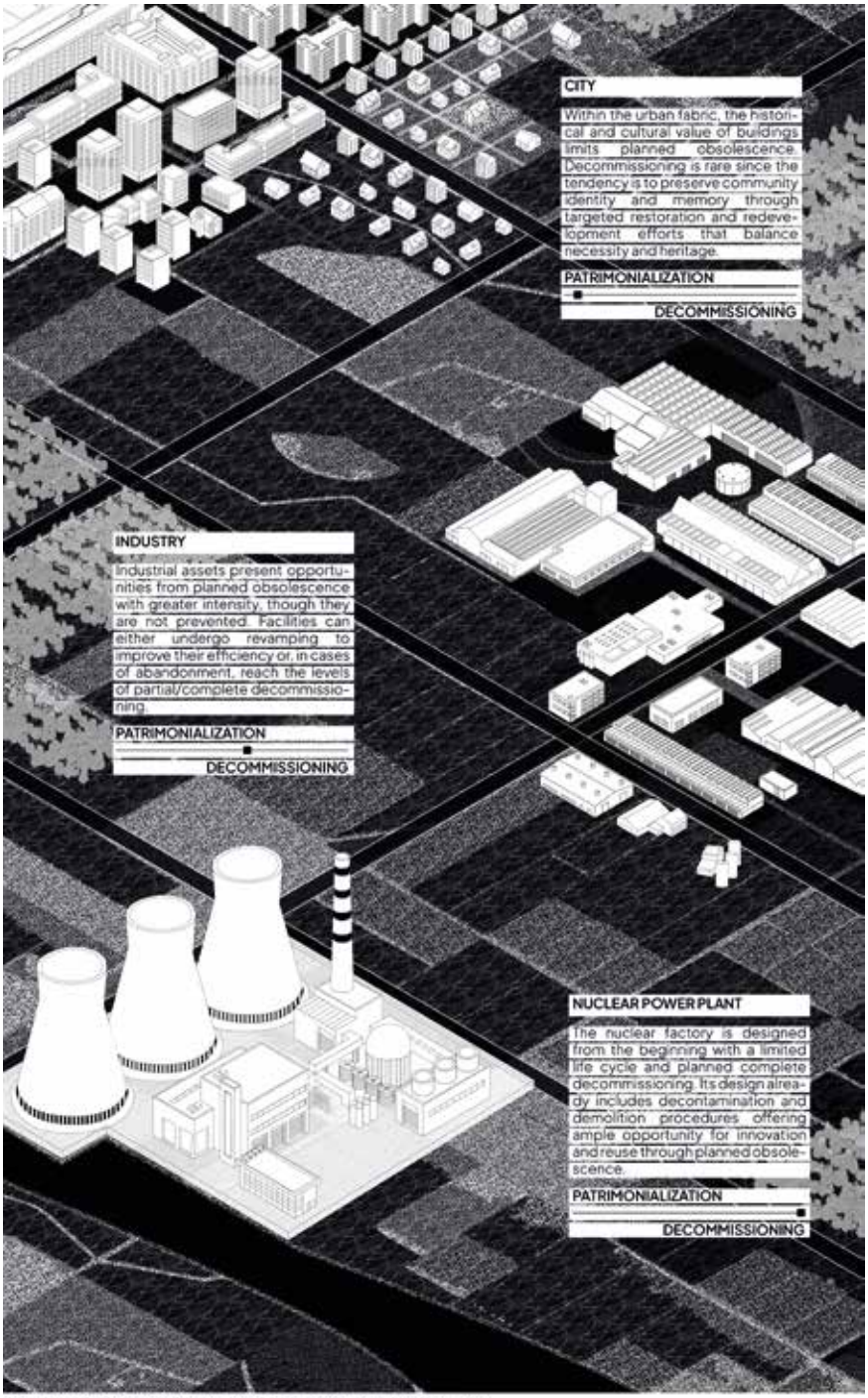
What opportunities does the decommissioning of large nuclear factories offer to architectural design applied to landscape? How can architectural design positivize the principles of planned obsolescence of nuclear factory and expand them to other assets?

Using the decommissioning of NPP as a crucial case study, the research reduces the knowledge gap on nuclear architectural heritage to structure concrete sector literature, investigate the opportunities offered by the sector's technological innovation (SMR, AMR, Generation IV reactors) and analyze the transformative possibilities of this asset - revamping, energetic reuse, adaptive reuse, storage. The goal is to identify design strategies capable of exploiting planned subtraction through the design of construction and recycling.

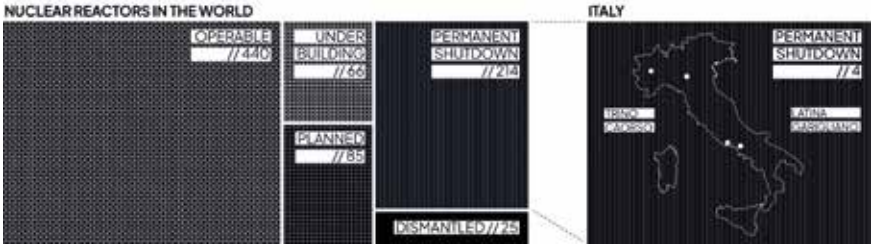
To achieve these goals, the research aims to develop a taxonomy of 10 case studies - under construction, built, and decommissioned - to track best/worst practices through a comparative analysis of existing heritage know-how. In addition, the research project intends to realize an abacus of the opportunities offered by next-generation nuclear and planned subtraction by leveraging technological innovations - AI and machine learning - as collaborative supervised tools to traditional analytical methodologies. Finally, by adopting a "cradle to cradle" approach and research-by-design methodology, the research aspires to return meta-design solutions that relate the two NPP life phases in a bilateral design based on the literature produced.

The ultimate goal is to return design strategies capable of reintroducing the "nuclear factory" into architectural practice and to increase its literature. The research intends to harness this energy as a response to the pressing global needs by designing architectural processes that enhance the productive life of the NPP and can exploit the opportunities offered by the principle of obsolescence.

#decommissioning, #designing obsolescence, #nuclear power plant



PLANNED OBSOLESCENCE AND POSSIBILITIES: CITY - INDUSTRY - NPP



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The chosen topic “environments” as a title for this compilation is a strong topic. Dealing with changing contexts, the themes under research, analysis and critical interpretation by the PhD candidates epitomize contemporary social issues, reflecting the era in which we live in and demonstrate the power of architecture in addressing the challenges of the future.

Ana Tostões, Afterword