

***Advanced Fuel Cycle Cost Basis Report:  
Supporting Document 1 Justification for  
Major Revision to 2017 Version of the  
Advanced Fuel Cycle Cost Basis Report:  
Addition of “Methodology Description”  
and “Revision History” to Every Fuel  
Cycle Module***

**Nuclear Fuel Cycle and  
Supply Chain**

***Prepared for  
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**Justification for Major Revision to 2017 Version of the Advanced Fuel Cycle Cost Basis Report:  
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## **Acknowledgement**

This latest version of the Supporting Document 1 Justification for Major Revision to 2017 Version of the Advanced Fuel Cycle Cost Basis Report: Addition of “Methodology Description” and “Revision History” to Every Fuel Cycle Module is the result of the cumulative effort of many authors that have contributed to the Advanced Fuel Cycle Cost Basis Report. It is not possible to identify and acknowledge all those contributions to this module. All the authors, including the four primary authors, fifteen contributing authors, the twelve contributors acknowledged, and the many other unacknowledged contributors in the 2017 version of the report may have contributed various amounts to the development and writing of this module prior to this current revision. Unfortunately, there is no history that allows us to properly acknowledge those that built the foundation that was updated and revised in this latest revision.

This is just a reformatting of previous work to the current format for rerelease of the entire report so there is no primary technical developer or lead author. J. Hansen (INL) and E. Hoffman (ANL) can be contacted with any questions regarding this document.

**Justification for Major Revision to 2017 Version of the Advanced Fuel Cycle Cost Basis Report:  
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**Justification for Major Revision to 2017 Version of the *Advanced Fuel Cycle Cost Basis Report*: Addition of “Methodology Description” and “Revision History” to Every Fuel Cycle Module**

Since its inception on 2004 the *Advanced Fuel Cycle Cost Basis Report* has been a “living document” subject to the following:

- Addition or deletion of Modules
- Inclusion of new data forming the basis for the “What-it-Takes” unit cost tables and the associated probability distributions
- Inclusion of cost escalation
- Addition of new topical chapters at the beginning of the document
- Inclusion of an updated “Unit Cost Summary Table” at the front of the report
- In some years (e.g. 2016) the document has been produced as an *Update* rather than a “full” document including all Modules.

For every Module the “full” AFC-CBR version includes significant introductory and background material, including process descriptions, interfaces with other Modules, historical data, reference cost information, assessment of recent cost information, the “What-it-Takes” unit cost tables, and for later versions the suggested probability distributions to accompany the “WIT” data. This is all accompanied by a bibliography and/or a list of references. As a new version is developed, older historical information or reference cases are not deleted, but rather are augmented by the more recent information. For this reason, and the addition of new Reactor Modules in 2015, the “full version” document size has grown to well over 1000 pages. This large volume size makes the document difficult to review, and also difficult to edit, print, and distribute in a hard copy version. It also creates an electronic version which even in PDF format requires several dozen megabytes (MB) of file size, thus making it difficult to distribute electronically.

It should also be noted that in every year a “full” version was produced not all Modules were augmented with new material or even had the “WIT” table corrected for escalation. The FCRD program has not always had the funding resources to comprehensively revisit every Module during every year of issue. The modules selected for reanalysis are those that are judged to have the most effect on overall system fuel cycle costs and include the LWR (R1) and Fast Reactor (R2) Modules, the front-end Modules (A,B,C, and K1) for “once-through” fuel cycles, MOX fuel fabrication (D1-2), and the major Reprocessing Modules (F1 and F2/D2).

The new document production concept hereby introduced in 2017 is to create a large AFC-CBR “folder” where individual front-end chapters and individual Modules can be accessed from a centralized server via the Internet. (In FY2018 it is intended to submit the 2017 folder for formal classification review such that it can ultimately be made available on a Web-based public server.) It has been decided that every Module file in the overall document server folder needs brief explanatory material at the beginning that succinctly identifies its history (vintage) and the timing and nature of the most recent technical and cost escalation data upon which the WIT unit costs are based. It has also been determined that for consistency under a “level-playing field” approach all Module unit cost data should also include escalation to the year of document issue, even if new technical basis data is not included.

The following presents how the two new sections will appear in each Module (or each Sub-Module in the case of Modules A, C, D, E, F, G, K, L, O, and R). [For example, the Reactor Module contains 9 sub-Modules R1 through R9.] Possible entries for each of the generic “bullets” are shown.

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**X-MD. SHORT DESCRIPTION OF METHODOLOGY USED FOR ESTABLISHMENT OF MOST RECENT COST BASIS AND UNDERLYING RATIONALE**

- **Constant \$ base year for 2017 Update:** FY 2017 (the same for all Modules in this version)
- **Nature of this 2017 Module update from previous AFC-CBRs:** Two possibilities:
  - o Escalation only from last time WIT values underwent technical assessment. Some edits may be included, however, that update the overall deployment status of the technology, such as known facility closures and new facility construction status that do not constitute a baseline cost data change that affects the existing WIT data.
  - o Addition of new technical data and supporting new cost baselines and uncertainty bounds updating the WIT values and the probability distributions. Considerable explanatory data may be included.
- **Estimating Methodology for latest (2009 AFC-CBR) technical update from which this 2017 update was escalated:** Several possibilities exist here. Very specific technology information may be included.
  - o Actual pricing data for the commodity or fuel cycle service
  - o Known published service or unit product costs based on actual facility data
  - o Unit costs calculated from a bottom-up life cycle cost estimate for a proposed new facility
  - o Unit costs derived by scaling or analogy to a similar type facility for which costs are known or have been estimated
  - o Data or opinions transmitted by personal communication and not necessarily vetted.

**X-RH. Revision History**

- **Version of AFC-CBR in which Module first appeared:**
  - o Self explanatory. The AFC-CBR version in which a module was split into sub-modules or re-named is also mentioned.
- **Version of module in which new technical data was used to establish “what-it-takes” unit cost ranges:**
  - o The AFC-CBR year in which new or revised technical data and an associated cost baseline resulted in new WIT table results and uncertainty ranges or distributions. Escalation from this “latest technical/cost reference” year to the present should be used for the 2017 updated WIT information.
- **New technical/cost data which has recently become available and will benefit next revision:**
  - o List new reports that support or augment information in module. These reports can eventually be placed in a server-based electronic folder/file system similar to that for the actual modules.
  - o Known technical and/or institutional developments in a particular fuel cycle area that are likely to have unit cost consequences, and that should warrant revisiting a particular Module in future AFC-CBR versions.