ARIES-IFE Systems Activities

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ARIES Project Meeting

UCSD

December 5–7, 2000

UCSD

ARIES-IFE Systems Activities*

- Direct Costs
  - reconciliation of Cost Breakdown Structure (CBS)
    - - IFE $versus$ MFE
  - Target/Pellet Factory$^{(a)}$
  - learning-curve credits
  - LSA update/replacement/rejection
- Financial assumptions:
  - N-unit plant (N=1,2,...)
  - Apply consensus cost model$^{(b)}$
  - 'Soft' assumptions:
    - - construction lead time
    - - plant factor, p_f

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* since last Project Meeting (Sep.).

$^{(a)}$ A. Nobile, "Concepts for Fabrication of Targets for a Heavy Ion Driven Inertial Fusion Energy Plant," ANS 14th TOFE (Oct. 2000) [to be published.]

$^{(b)}$ $cf.$, J. Delene, $et\ al.$, ORNL/TM-1999/243/R1 (Feb. 2000).

ARIES-IFE Systems Activities*

- Driver models
  - DPSSL[(a)]
  - KrF[(b)]
  - Heavy Ion (Wayne)
- Gain models
  - KrF laser [(c)]
  - Heavy ion[(d)]

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* since last Project Meeting (Sep.).

(a) C. D. Orth, S. A. Payne, and W. F. Krupke, "A Diode Pumped Solid State Laser Driver for Inertial Fusion Energy," *Nucl. Fus.*, 36, 1 (1996) 75.

(b) M. W. McGeoch, P. A. Corcoran, R. G. Altes, I. D. Smith, S. E. Bodner, R. H. Lehmberg, S. P. Obenschain, and J. D. Sethian, "Conceptual Design of a 2-MJ KrF Laser Fusion Facility," *Fusion Technology*, 32, 4 (December 1997) 610.

(c) S. E. Bodner, D. G. Colombant, A. J. Schmidt, and M. Klapisch, "High-gain direct-drive target design for laser fusion," *Physics of Plasmas*, 7, 6 (June 2000) 2298.

(d) D. A. Callahan-Miller and M. Tabak, "Increasing the coupling efficiency in a heavy ion, inertial confinement fusion target," *Nuclear Fusion*, 39, 11 (1999) 1547.

ARIES-IFE Systems Activities*

- New Modelling Tools...
  - MicroSoft Excel/Crystal Ball, etc.

- ...applied to the IFE system$^{(a)}$
- Design-Window emphasis
  - Risk analysis and uncertainty

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* since last Project Meeting (Sep.).

$^{(a)}$ S. E. Bodner, "How the Cost of Electricity Varies with Laser Efficiency and Target Gain," NRL report NRL/MR/6730–98-8193 (Sep. 30, 1998).

ARIES-IFE Systems Activities*

- COTS Modelling Tools...
  - Microsoft Excel/Crystal Ball, etc.
  - Influence diagram$^{(a)}$

- ...applied to the IFE system$^{(b)}$
- Design-Window emphasis
  - Risk analysis and uncertainty

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* since last Project Meeting (Sep.).

$^{(a)}$ Definitive Scenario, Definitive Software, Inc.

$^{(b)}$ S. E. Bodner, "How the Cost of Electricity Varies with Laser Efficiency and Target Gain," NRL report NRL/MR/6730–98-8193 (Sep. 30, 1998).

ARIES-IFE Direct Costs

- Direct Costs
  - reconciliation of Cost Breakdown Structure (CBS)
  - OSIRIS[a]/SOMBRERO[b]
  - PROMETHEUS[c]
  - HYLIFE-II[d]
  - Target/Pellet Factory[e]

[a] Table 8.4., p. 8-14, WJSA-92-01 (1992).

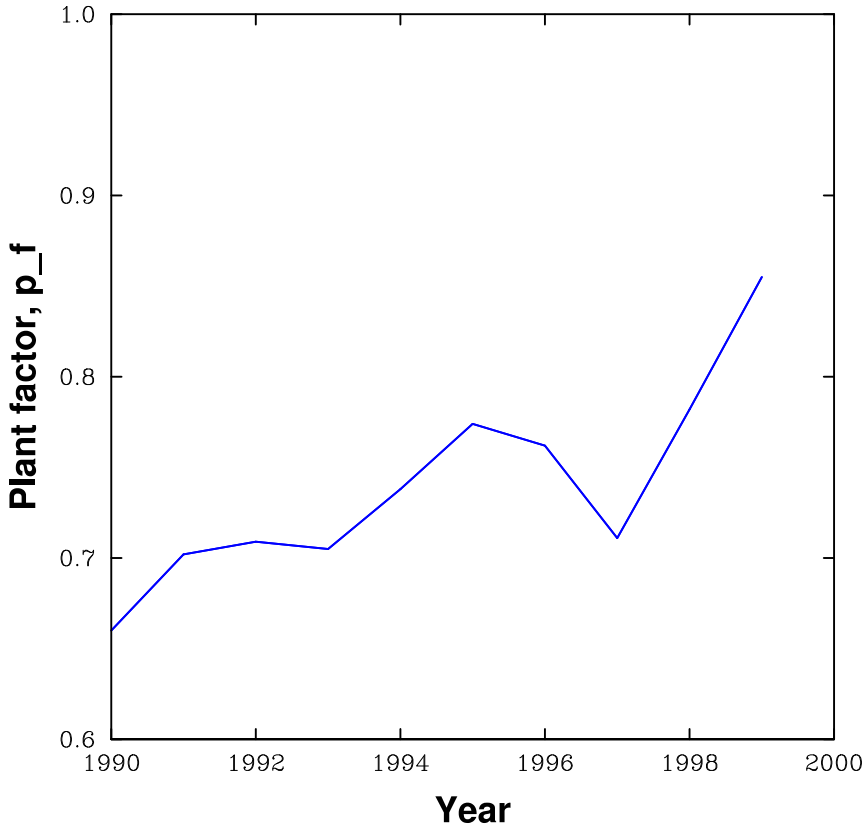
[b] Table 8.8., p. 8-27, WJSA-92-01 (1992).

[c] Table C-3, p. C-3, MDC 92E0008 (1992).

[d] R. W. Moir, *et al.*, FT, 25, 1 (1994) 5.

[e] A. Nobile, "Concepts for Fabrication of Targets for a Heavy Ion Driven Inertial Fusion Energy Plant," ANS 14th TOFE (Oct. 2000) [to be published.]

US Fission Plant Factor*



- Fission fleet performance has improved.
  - 1999 entry is “preliminary”.
- AP600 target is 0.90†

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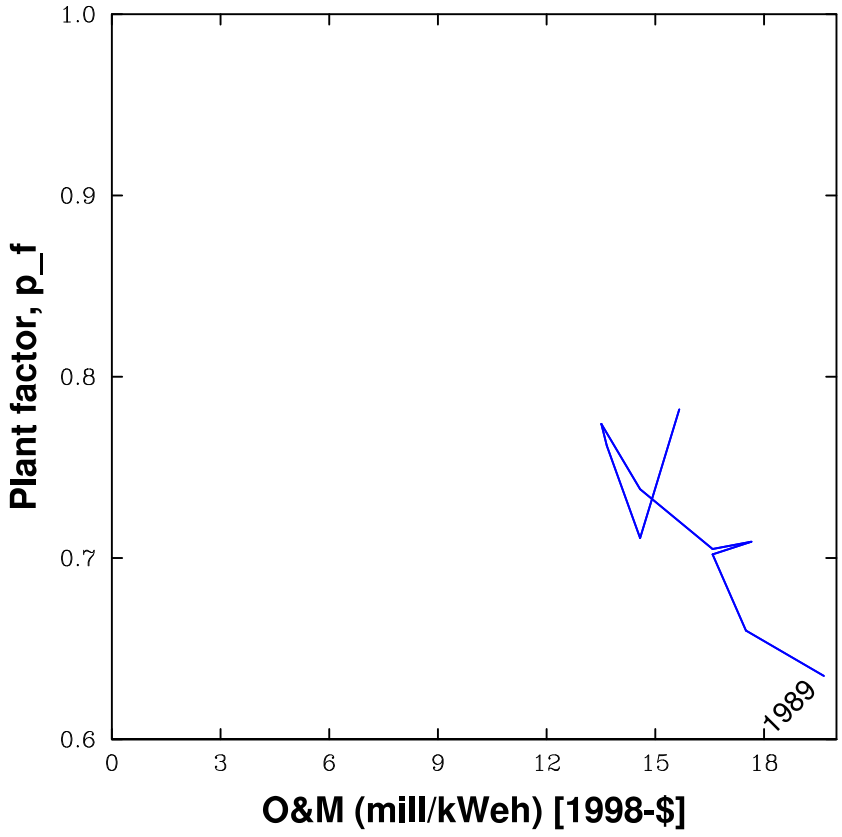
* Annual Energy Review 1999, DOE/EIA-0384(99) (July 2000) p. 247.

† J. W. Winters, “The AP600– Design certified and ready to build,” *Nuclear News*, 43, 10 (Sep. 2000) 36.

US Fisson Metric



- Recent $p_f{}^{(a)}$ $versus$ $C_{O\&M}{}^{(b)}$

$^{(a)}$ Annual Energy Review 1999, DOE/EIA-0384(99) (July 2000) p. 247.

$^{(b)}$ T. Moore, “License Renewal Revitalizes the Nuclear Industry,” EPRI Journal, 25, 3 (Fall 2000) 8.