

Renaissance Watch

An update on developments that may lead to new power reactors

In what follows, **BOLD CAPITALS** are used for projects under (or approved for) construction; **bold** indicates a submitted application; *italics* means that an application is forthcoming. Acronyms: ACRS, Advisory Committee on Reactor Safeguards; ASLB, Atomic Safety and Licensing Board; COL, combined construction and operating license; COLA, COL application; CS, proposed date for the start of commercial operation; EPC, engineering, procurement, and construction; ESP, early site permit; FEIS (DEIS), final (draft) environmental impact statement; FSER (DSER), final (draft) safety evaluation report; ITAAC, inspections, tests, analyses, and acceptance criteria; MH, mandatory hearing and final decision; RAI, request for additional information; TBD, to be determined.

In many cases, detailed schedules for the NRC staff's technical reviews are in effect, and the following abbreviations are used for the phases of design certification: P1 (RAIs issued by the NRC); P2 (SER with open items); P3 (ACRS review of SER); P4 (advanced SER); P5 (ACRS review of advanced SER); P6 (FSER). COLA reviews are based on the same six phases (referred to below as SP1 through SP6), but in some cases, the NRC is using a four-phase safety review with letters instead of numbers (SPA through SPD), essentially skipping SP2 and SP3. The COLA environmental review has four phases: EP1 (scoping); EP2 (DEIS); EP3 (comments on DEIS); EP4 (FEIS).

Under construction

WATTS BAR-2, 1,177-MWe Westinghouse pressurized water reactor, Tennessee Valley Authority; Spring City, Tenn.; close to 100 percent complete. CS: December 2015, but a delay to mid-2016 is considered possible by TVA officials. FSER: December 2014, perhaps with supplements later; *FEIS issued May 29, 2013*. Depending on when the NRC takes final action on license issuance, fuel loading is now tentatively scheduled for May. There are no admitted contentions.

BELLEFONTE-1, 1,213-MWe Babcock & Wilcox PWR, TVA; Scottsboro, Ala.; 55 percent complete. CS: 2018–2020. On-site construction will not resume until Watts Bar-2 loads fuel; procurement and other project spending have been authorized by TVA's board of directors.

VOGTLE-3, -4, 1,100-MWe Westinghouse AP1000s, Southern Nuclear Operating Company; Waynesboro, Ga.; about 50

percent complete in EPC terms. CS: November 2016, November 2017. *The COLs were issued on February 10, 2012*. ITAAC status: for Unit 3, nine closed and confirmed by the NRC; for Unit 4, eight closed and confirmed.

SUMMER-2, -3, AP1000s, SCANA/Santee Cooper; Parr, S.C.; completion percentage not yet stated. CS: late 2016, mid-2018. *The COLs were issued on March 30, 2012*. ITAAC status: for Unit 2, 11 closed and confirmed by the NRC; for Unit 3, six closed and confirmed.

License applications

Both to save space and to keep the focus on the most active projects, the following list excludes Ameren Missouri's Callaway -2, Duke Energy's Harris-2 and -3, Entergy's Grand Gulf-3 and River Bend-3, Luminant Power's Comanche Peak-3 and -4, and TVA's Bellefonte-3 and -4, which have been suspended at the request of the applicants.

Calvert Cliffs-3, U.S. EPR, UniStar Nuclear Energy; Lusby, Md. CS: TBD; FSER: TBD; *FEIS issued May 13, 2011*. SP1 completed, April 2010; SP2 due, TBD (15 chapters are complete, as are parts of three others; four chapters for SP4 are also finished). The ASLB terminated the licensing proceeding in November 2012 on the grounds of UniStar's foreign ownership, but the NRC staff is still carrying out technical reviews, and UniStar could apply later to reopen the proceeding.

South Texas-3, -4, Toshiba ABWRs, Nuclear Innovation North America (NINA); Palacios, Texas. CS: TBD; FSER: September 2015; *FEIS issued February 24, 2011*. SP3 completed, November 2010; SP4 due, December 2014 (18 chapters complete). All three intervenor contentions have been resolved in NINA's favor. An EPC contract was signed in February 2009.

North Anna-3, ESBWR, Dominion Generation; Mineral, Va. CS: TBD; FSER: March 2016; *FEIS issued March 17, 2010*. SP3 done, November 2009; SP4 due, September 2015. Dominion and GE Hitachi Nuclear Energy have stated that they have agreed on all contract terms, although Dominion has not committed to building the reactor and so has not signed an EPC contract. The hearing record is closed, but a new contention has been submitted in connection with the August 2011 earthquake near the site.

Lee-1, -2, AP1000s, Duke Energy; Gaffney, S.C. CS: 2024, 2026; FSER: December 2015; *FEIS issued December 20, 2013*; MH: April 2016. SPA completed, May 2010; SPB due, May 2015 (15 chapters completed). There are no intervenor contentions.

Levy-1, -2, AP1000s, Duke Energy; Levy County, Fla. CS: 2024, 2025–2026. FSER: March 2015; *FEIS issued April 27, 2012*. SPC completed, January 2012. The contested hearing was resolved in

Duke's favor. The EPC contract was canceled on August 1, 2013.

Fermi-3, ESBWR, DTE Energy; Monroe, Mich. CS: June 2020; FSER: January 2015; *FEIS issued January 4, 2013*; MH: Not yet scheduled. SP3 completed, September 2014. Both intervenor contentions were resolved in DTE's favor.

Bell Bend, U.S. EPR, PPL/UniStar; Berwick, Pa. CS: TBD; FSER: TBD; FEIS: TBD. The NRC has begun a supplemental scoping process because of the relocation of the nuclear island. One SER chapter has been finished. There are no intervenor contentions.

Turkey Point-6, -7, AP1000s, FPL; Florida City, Fla. CS: 2022, 2023; FSER: October 2016; FEIS, February 2016; MH: TBD. SPA due, June 2015 (six chapters are finished). EP1 completed, December 2010; EP2 due, February 2015. One intervenor contention is currently admitted into the hearing process.

Eastern Idaho, two or more NuScale reactors, Utah Associated Municipal Power Systems with Energy Northwest; on or near property of Idaho National Laboratory. Application submittal is planned for 2017.

Early site permits

PSEG site, reactor TBD, PSEG; Salem, N.J. FSER: TBD; FEIS: September 2015. SPA due, TBD. EP2 completed, August 2014; EP3 due, December 2014.

Clinch River, reactor TBD, TVA; Clinch River, Tenn. Submittal of the application is planned for fall 2015. TVA had previously planned a construction permit application for two to six mPower reactors, but because of the slowdown in mPower development, TVA made it official in September that it will instead apply for an ESP with a plant parameter envelope based on integral pressurized water reactor design features.

Blue Castle Project, reactor TBD, Blue Castle Holdings; Green River, Utah. The application is currently planned for submittal in late 2016.

Design certification

ABWR, 1,350-MWe boiling water reactor, GE Hitachi or Toshiba. The original General Electric design was certified in 1997. **The final certification rule for Toshiba's version, for South Texas-3 and -4, was published on December 16, 2011, and became effective on January 17, 2012.** GE Hitachi and Toshiba have both applied for the renewal of the ABWR certification, which expired in 2012. The NRC has docketed both applications, with no review schedules issued as of this writing.

AP1000, 1,100-MWe PWR, Westinghouse. This design was certified in 2006. In 2007, Westinghouse applied to amend the design. **The final certification rule was published on Decem-**

ber 30, 2011, and became effective immediately.

ESBWR, 1,520-MWe BWR, GE Hitachi. **The final certification rule was published on October 15, 2014, with an effective date of November 14.**

U.S. EPR, 1,600-MWe PWR, Areva. The certification target date is TBD because of the NRC's continued dissatisfaction with the digital instrumentation and control system. Areva is responding to NRC requests for additional information in stages, from now through late 2016. P3 completed, May 2012; P4 due, TBD.

US-APWR, 1,700-MWe PWR, Mitsubishi Heavy Industries. At the applicant's request, work was suspended at the end of March; all target dates are now TBD. P1 completed, January 2009; P2 due, TBD (17 chapters finished).

APR1400, 1,400-MWe PWR, consortium led by Korea Electric Power Corporation. The NRC stated that the application submitted in 2013 did not contain sufficient information and did not accept it for docketing. The consortium planned to resubmit the application by the end of 2014.

Westinghouse SMR, 225-MWe integral PWR, Westinghouse. The application submittal date is TBD, and Westinghouse has reduced work on the design.

mPower, 180-MWe integral PWR, Generation mPower (Babcock & Wilcox/Bechtel). The application submittal date is TBD. A draft set of design-specific review standards was issued in May 2013.

NuScale, 45-MWe integral PWR, NuScale Power. The application is expected in the second half of 2016.

SMR-160, 160-MWe integral PWR, Holtec International. The application submittal date is TBD.

XE-100, 100-MWt (electrical rating not yet specified) pebble-bed fueled gas-cooled reactor, X-Energy Inc. This startup company has told the NRC that it intends to apply for certification, and the NRC does not currently specify an expected submittal date.

There are no other declared certification candidates at this time, but many other designs have been proposed, among them Gen4 Energy's liquid metal-cooled *Gen4 Module*; TerraPower's project, still known as the *Traveling Wave* reactor despite design changes that would make the "wave" stationary; General Atomic's gas-cooled *Energy Multiplier Module*; and Areva Inc.'s gas-cooled *SC-HTGR*, named the preferred design of the NGNP Industry Alliance, which may apply for a construction permit in the period 2016–2018. The Department of Energy is not pursuing licensing for the NGNP, which was established by Congress to be built by the DOE, and no public-private partnership has been established.