

Nuclear power

Before the Fukushima Daiichi nuclear accident in 2011, Japan was a leading producer of nuclear power in the world. With a capacity of 49 GW, the country produced around 288 TWh/y of electricity in 2010 which was delivered to the grid (IEA, 2013). However, in the aftermath of the 2011 Fukushima disaster, none of Japan's nuclear power stations are in operation as of 2014. Some drastic changes in the country's nuclear power production were expected. Two major policy decisions will affect the future of Japan's nuclear energy. The first one is related to the restart policy of the existing nuclear power plants. The second issue concerns the impact of new-build policy on future capacity.

Impact of restart policy

Trajectory A

Trajectory A assumes that Japan will shut down all of its nuclear power plants from 2010 onwards and they will never be restarted. In other words Japan will phase out its nuclear capacity completely and focus on other sources of energy.

Figure 1 Impact of restart policy on future capacity (no new build assumed)



Source: Authors.

Trajectory B

Trajectory B for restart policy assumes that only half of the existing nuclear plants will be restarted. With no new-build rate, nuclear capacity will come down from 49 GW in 2010 to below 10 GW in 2030 and to zero by 2050.

Trajectory C

Trajectory C assumes a restart policy where Japan only allows all existing nuclear plants with a 40 year lifespan to operate. With the retirement of exhausted plants and no new-build, Japan's capacity will gradually decline, but at a slower pace than Trajectory B. By 2030, capacity will be around 19 GW and eventually zero by 2050.

Trajectory D

The assumption under Trajectory D is similar to Trajectory C, but here all plants with a 50 year lifespan are allowed to operate and no new plants

are built. It will mean that despite the declining trend, Japan will still have limited, 5.3 GW (32 TWh/y electricity) nuclear capacity.

Trajectory E

The assumption under Trajectory E is similar to Trajectories C and D. The difference is that plants with a 60 year lifespan are allowed to operate, though no new plants are built. Thus, though capacity will decline, Japan will still have limited, 18.9 GW (111 TWh/y electricity) nuclear capacity in 2050 as plants with longer lifespan are allowed to operate.

Impact of new-build policy

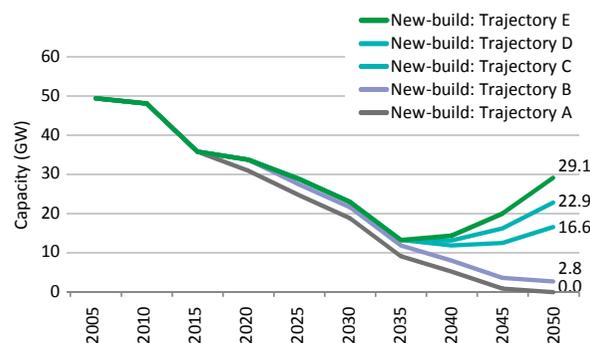
Trajectory A

Trajectory A assumes that no new nuclear plants will be developed and existing plants will retire once their lifespan is over. Assuming a full restart policy with a 40 year lifespan for the plants, Japan's existing nuclear capacity will go down gradually to 19 GW in 2030 and eventually to zero by 2050.

Trajectory B

This trajectory assumes that two of the three plants currently under construction (Ohma No. 1, Shimane No. 3) will be allowed to develop, but with a 5-year delay. . With a full restart policy (40 year lifespan), this trajectory will lead Japan's nuclear capacity to decrease to 2.8 GW in 2050, which will generate 16 TWh/y of electricity.

Figure 2 Impact of new build policy on future capacity (full restart with 40-year life assumed)



Source: Authors.

Trajectory C

In addition to Trajectory A, construction of TEPCO Higashidori No. 1 reactor will start operating with a 5-year delay. Furthermore, the operation of new-builds will take place from 2035 onwards, and Japan will achieve a 1GW/y build rate after 2040. With a full restart policy (40 year lifespan), Japan's nuclear capacity under this trajectory will be 16.6 GW (generating 105 TWh/y) in 2050.

Trajectory D

Trajectory D assumes a more aggressive new-build policy. The operation of new-builds will take place from 2035 with a new capacity installation rate of

1.5 GW/y from 2040 onwards. It will mean that with full restart policy (40 year lifespan) Japan's nuclear capacity will be 22.9 GW in 2050. The resulting generation will be 164 TWh/y.

Trajectory E

Trajectory E assumes the most aggressive new-build policy. The operation of new-builds will take place from 2035 with a new capacity installation rate of 2 GW/y from 2040 onwards. It will mean that with full restart policy (40 year lifespan) Japan's nuclear capacity will be 29.1 GW in 2050. The resulting generation will be 208 TWh/y.