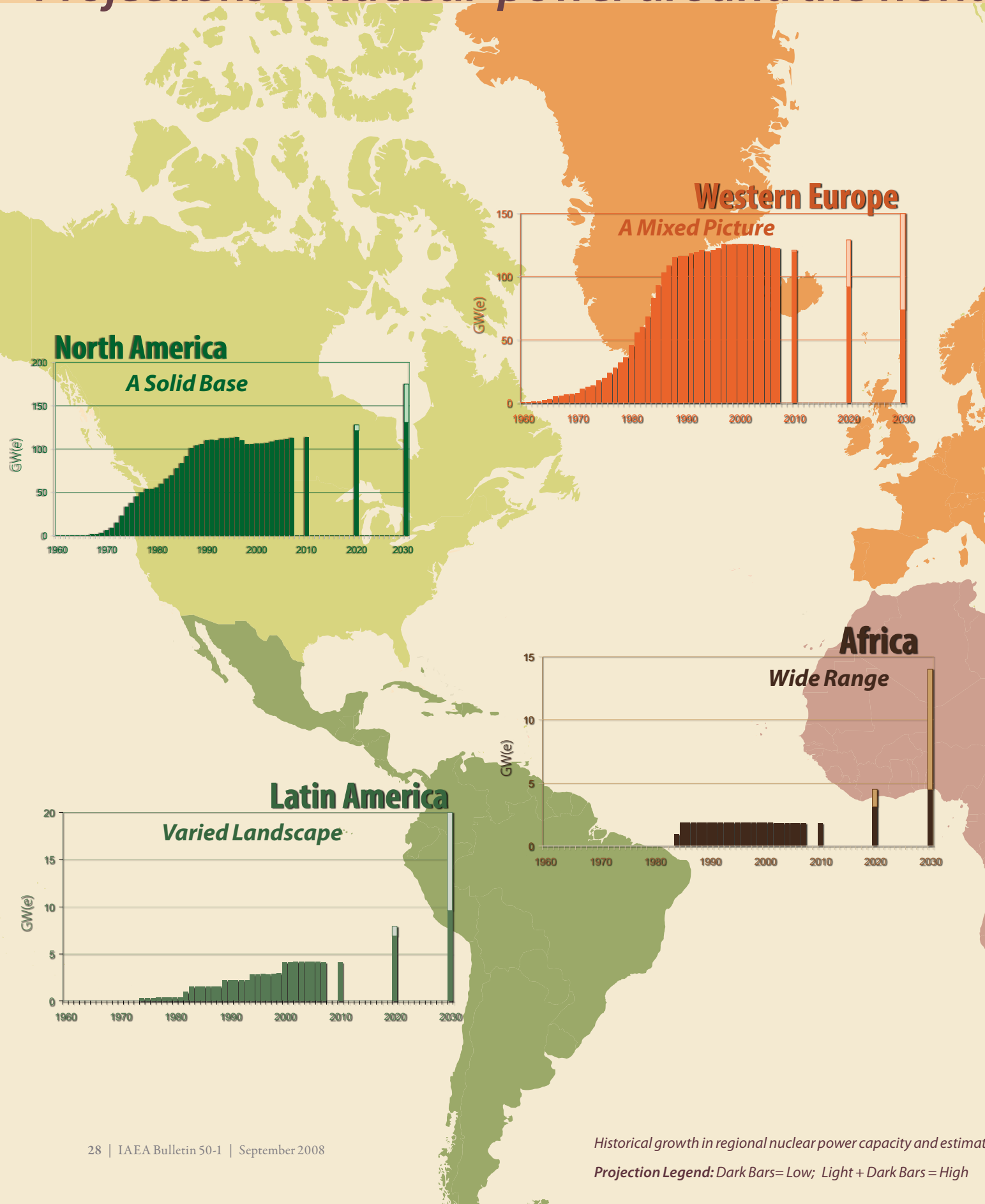


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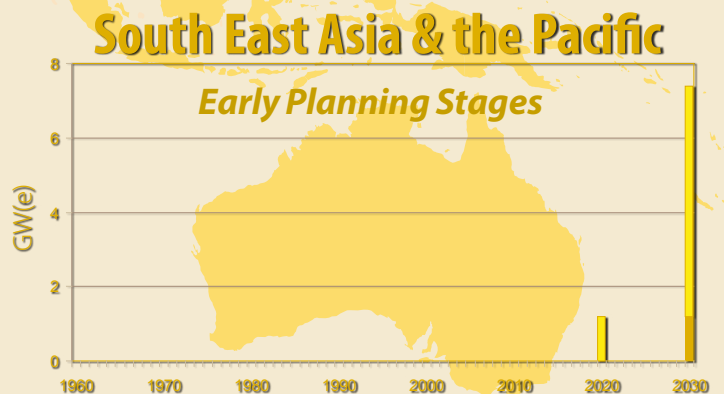
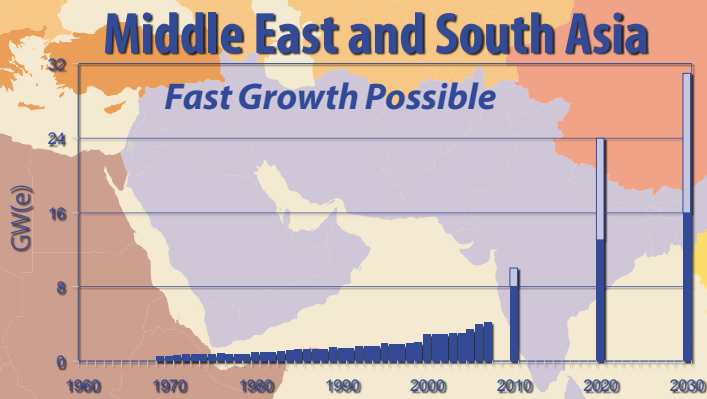
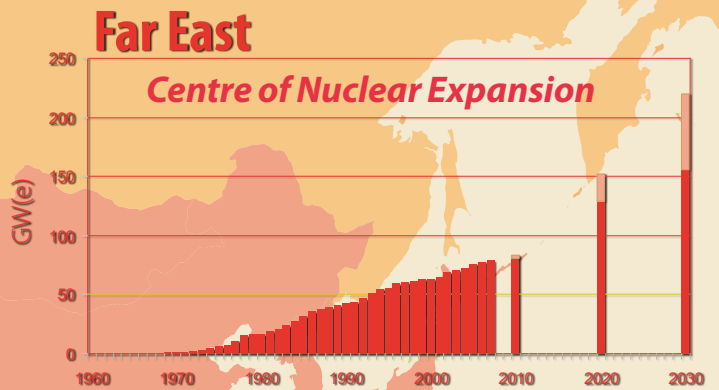
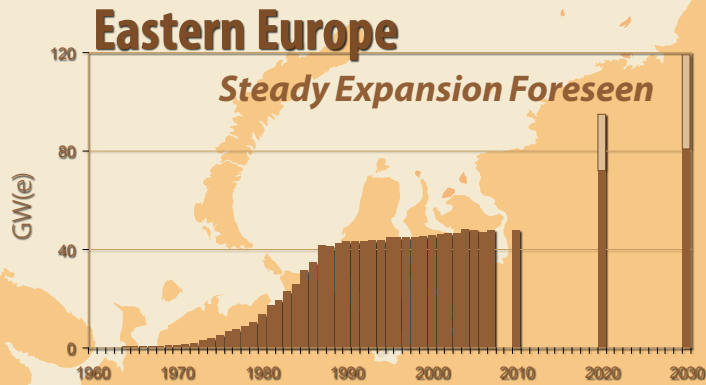
Projections of nuclear power around the world



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by Alan McDonald,
Hans-Holger Rogner and
Andrii Gritsevskiy

show an upward trend.



In its 2008 edition of *Energy, Electricity and Nuclear Power Estimates for the Period to 2030*, the International Atomic Energy Agency (IAEA) has again revised its projections for nuclear power upwards. At the same time, it reports that nuclear power's share of global electricity generation dropped another percentage point in 2007, to 14%. This compares to the nearly steady share of 16 to 17% that nuclear power maintained for almost two decades, from 1986 through 2005.

Rising Expectations

Every year since 1981 the IAEA has published two updated projections for the world's nuclear power generating capacity, a low projection and a high projection.

The low projection is a down to earth, business-as-usual projection. It assumes that nuclear investment projects currently underway or firmly in the pipeline are implemented, but not much more; that existing plants are retired as scheduled unless license extensions have been granted or applied for; and that current policies are unchanged, such as the German and Belgian phase-outs of nuclear power.

The results for the 2008 projections are shown in Figure 1. In the low projection, the projected nuclear power capacity in 2030 is 473 GW(e), some 27% higher than today's 372 GW(e). In the high projection, nuclear capacity in 2030 is 748 GW(e), double today's capacity.

Figures 2 and 3 respectively show how the low and high projections have changed since 2003 — the blue bars on the left are history.

Figure 3 shows that in every year since 2003 the high projection has been revised upwards. The low projection has also gone up, but less consistently. It has also gone up by a smaller amount than has the high projection, meaning the gap between the two, or the uncertainty about nuclear power's future that is reflected in the two projections, has also increased.

Why have projections gone up in the last five years? First is the current performance record. The world now has accumulated more than 13,000 reactor-years of experience. Performance has improved greatly since the 1980s, and the safety record of the types of reactors on the market today is excellent.

Second, although nuclear capacity additions since 1986 fell behind the growth of total electricity generation, nuclear power's market share held steady due to increases in the average load factor of the global reactor fleet from 67% in 1990 to more than 80% since early 2000.

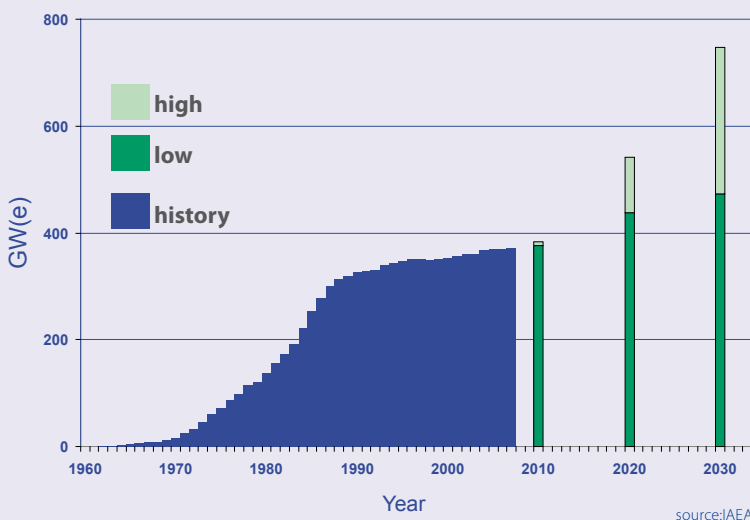
Third, energy demand projections keep showing persistent long-term growth. The world is going to need a lot more energy, so more people are thinking about nuclear power being an important part of the mix.

Fourth is energy supply security. In the 1970s concerns about supply security, triggered by the oil price shocks, were a major cause of nuclear expansion in Finland; France; Germany; Japan; Taiwan, China; Sweden and other countries. Similar concerns may also prove important today.

Fifth are major expansion plans in key countries like China and India and new policies and interest in nuclear power in countries like the UK and USA.

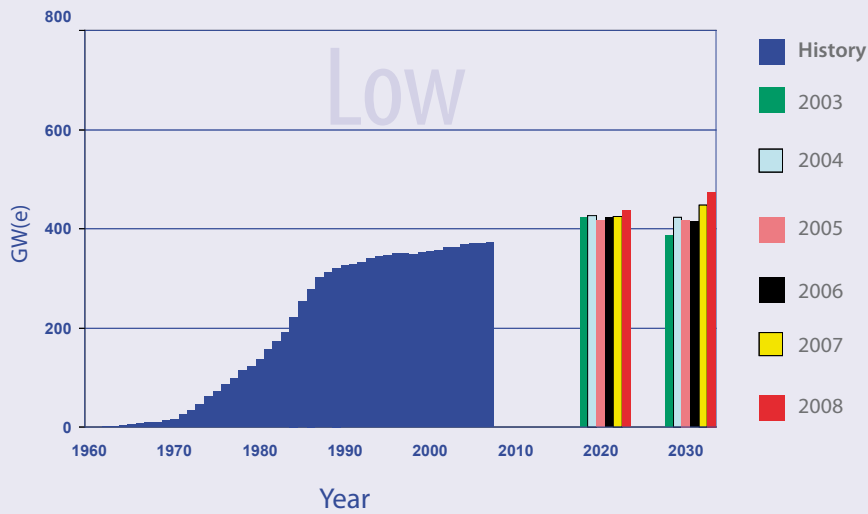
Sixth are new environmental constraints like entry-into-force of the Kyoto Protocol and the European carbon trading scheme (ETS). These mean there is now a real financial benefit to avoiding GHG emissions, which increases the attractiveness of low-carbon electricity generation, including nuclear power and renewables.

Fig 1. Historical growth in global nuclear power capacity (blue) plus estimates of future growth according to the IAEA's low projection (dark green) and high projection (light green).



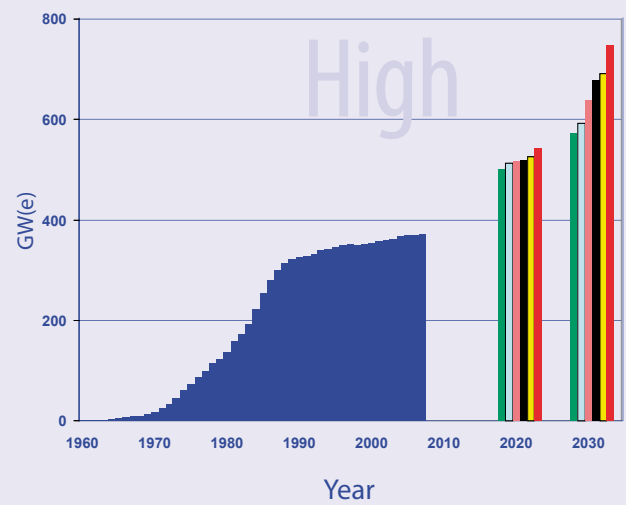
The high projection takes into account government and corporate announcements about longer-term plans for nuclear investments as well as potential new national policies, e.g., to combat climate change.

Fig 2: The Evolution of the IAEA's Low Projection since 2003



source:IAEA

Fig 3: The Evolution of the IAEA's High Projection since 2003



Seventh, the costs of the dominant alternatives to nuclear power are going up, particularly natural gas and coal.

A Declining Share

But while projections for nuclear power's future rose, its share of the world's electricity generation today dropped from 15% in 2006 to 14% in 2007. The reason is that while total global electricity generation rose 4.8% from 2007 to 2008, nuclear electricity actually dropped slightly.

The main reason that nuclear generation dropped was an earthquake in western Japan on 16 July 2007, which shut down all seven reactors at the Kashiwazaki-Kariwa nuclear power plant. The seven units total 8.2 GW(e), almost one sixth of Japan's nuclear capacity. There were also several other unusual outages and reductions in 2007, including the relicensing and consequent outage of a reactor in the Republic of Korea, the coincidence of a number of reactor outage schedules for refueling, and reduced generation at some German reactors in order to extend their operating life while meeting the generation limits imposed by the German phase-out.

Finally, it appears that the increases referred to above in the load factor for the current fleet of reactors have plateaued. Although some future increases can be expected as new plants with higher load factors replace old reactors, even these increases will eventually level off since the load factor can

never exceed 100%. Thus the impact of load factor improvements, which allowed past nuclear electricity production to grow at the same pace as total electricity output, has already begun to diminish.

What does the IAEA's 2008 update project for the nuclear share of electricity generation in the future? In the high projection, growth in nuclear generation matches the 3.2% per year growth in overall generation, and nuclear power's share therefore holds steady at 14%. In the low projection, overall electricity growth is lower, but nuclear power's growth is lower still, and by 2030 nuclear power's share of global electricity is projected to drop to about 12.5%.

Conclusion

The overall message from the IAEA's 2008 edition of *Energy, Electricity and Nuclear Power Estimates for the Period to 2030* is that global electricity use will grow significantly, that nuclear power will have to expand more rapidly than it has done recently in order to maintain its share, and that expectations are that nuclear power will meet the challenge. ☸

Alan McDonald is a senior analyst at the IAEA Department of Nuclear Energy. E-mail: A.McDonald@iaea.org

Hans-Holger Rogner is Head of the IAEA's Nuclear Energy Planning and Economic Studies Section, where Andrii Gritsevskiy is Energy Systems Analyst. E-mails: H.H.Rogner@iaea.org; A.Gritsevskiy@iaea.org