International Energy Agency

Hydropower and the global energy transition

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Status of Power System Transformation 2019

Focus on: Power System Flexibility

Co-authored by:

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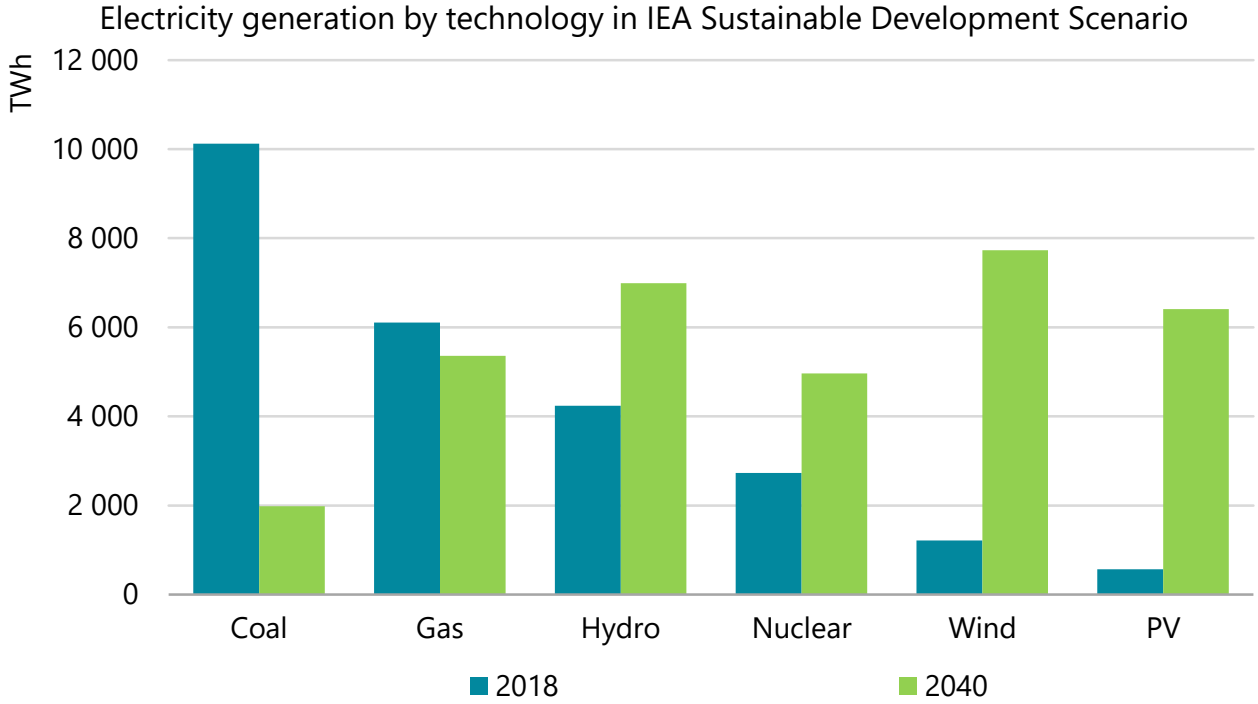
NREL Transforming ENERGY

Available at:

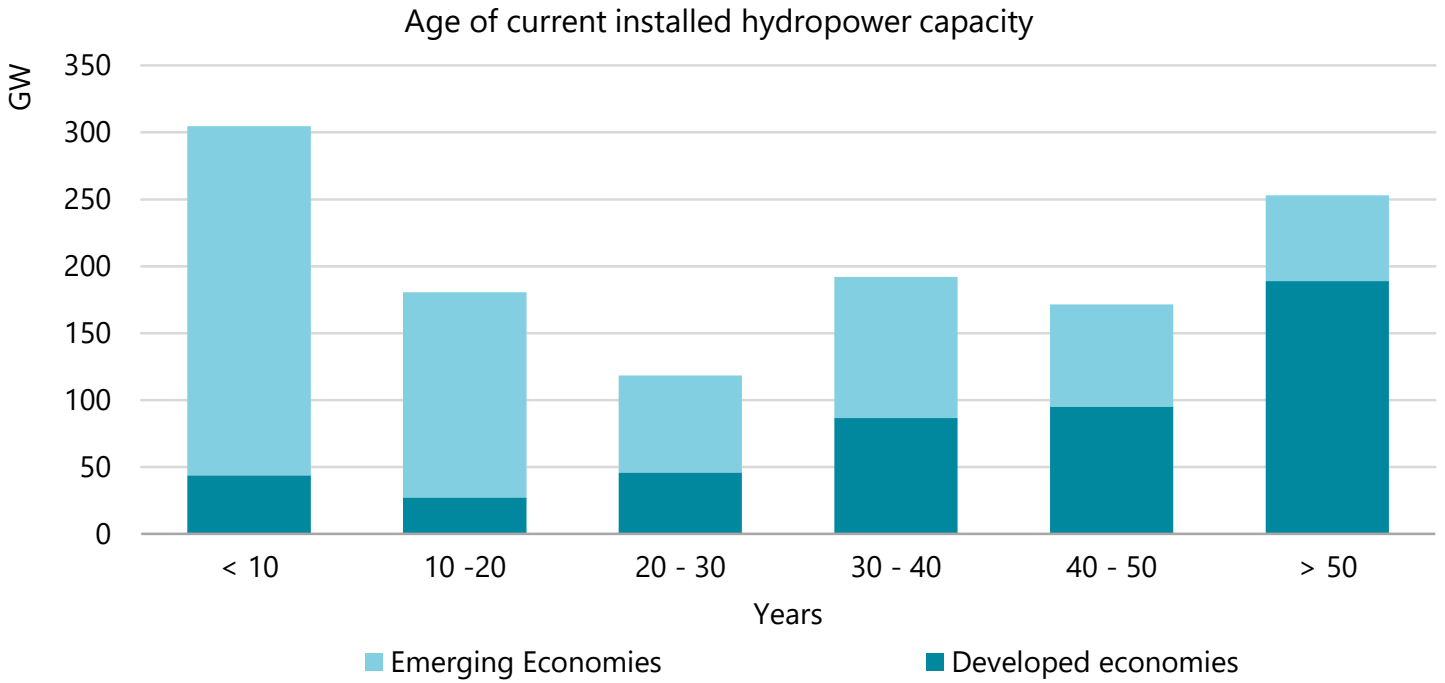
https://webstore.iea.org/status-of-power-system-transformation-2019

Hydropower can play a critical role in energy transitions



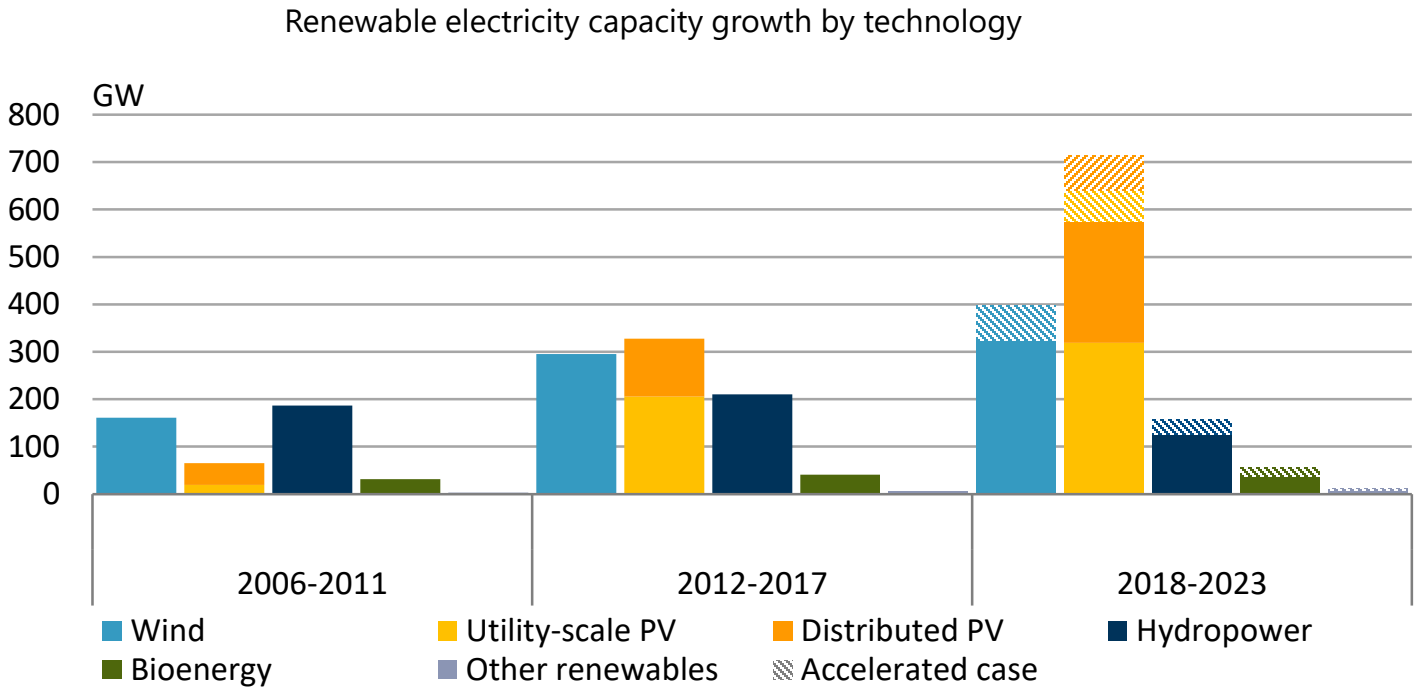
Hydropower has the potential to become the second largest source of electricity generation by 2040 in the IEA's Sustainable Development Scenario

Hydropower fleet is ageing



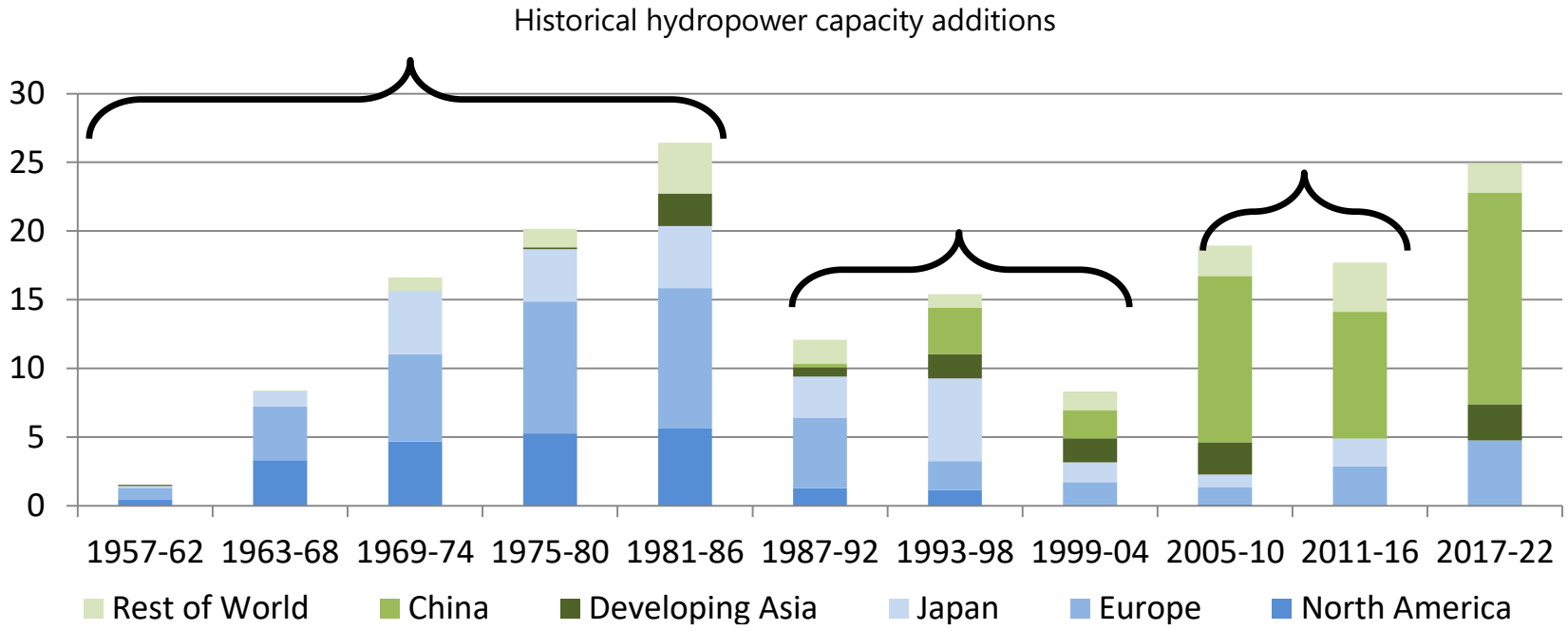
One-third of today's installed capacity is more than 40 years old, mostly located in developed economies.

Solar PV and wind expanding very fast in the next five years



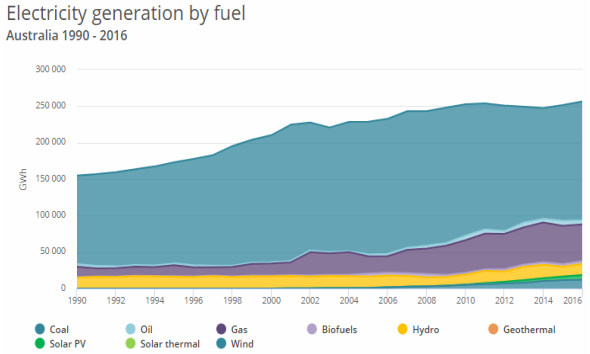
Distributed generation capacity growth makes the difference in solar PV's leadership
Cumulative PV capacity could reach 1.1 TW and wind over 0.9 TW by 2023 under the accelerated case

System flexibility drives a rebound in PSH investment

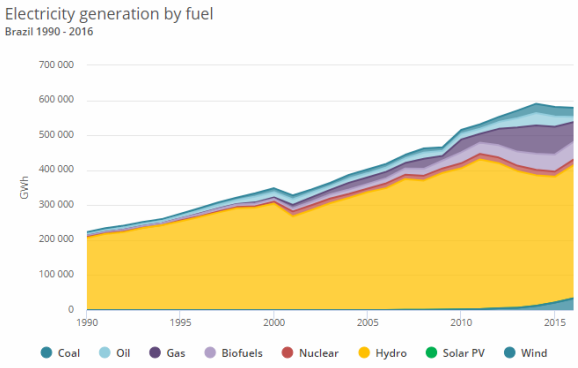


Over 2017-2022, 25 GW of PSH is expected, the second highest growth in the history, led by markets that need PSH flexible energy services to integrate their increasing shares of variable renewables.

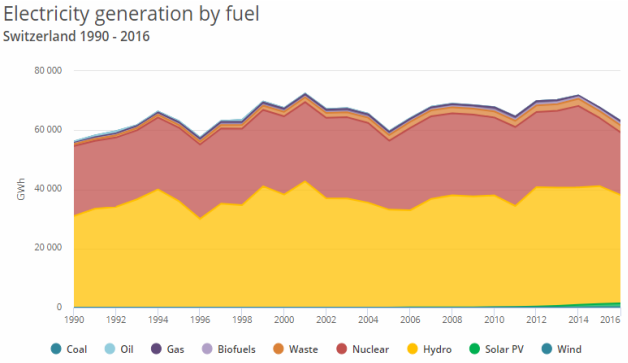
One technology – very different stories worldwide



- Significant variability due to geographically concentrated VRE in South Australia
- Battery of the nation project explores latent potential to balance NEM
- 400 MW of latent hydro flex
- Tasmanian hydro already operates in synchronous condenser mode

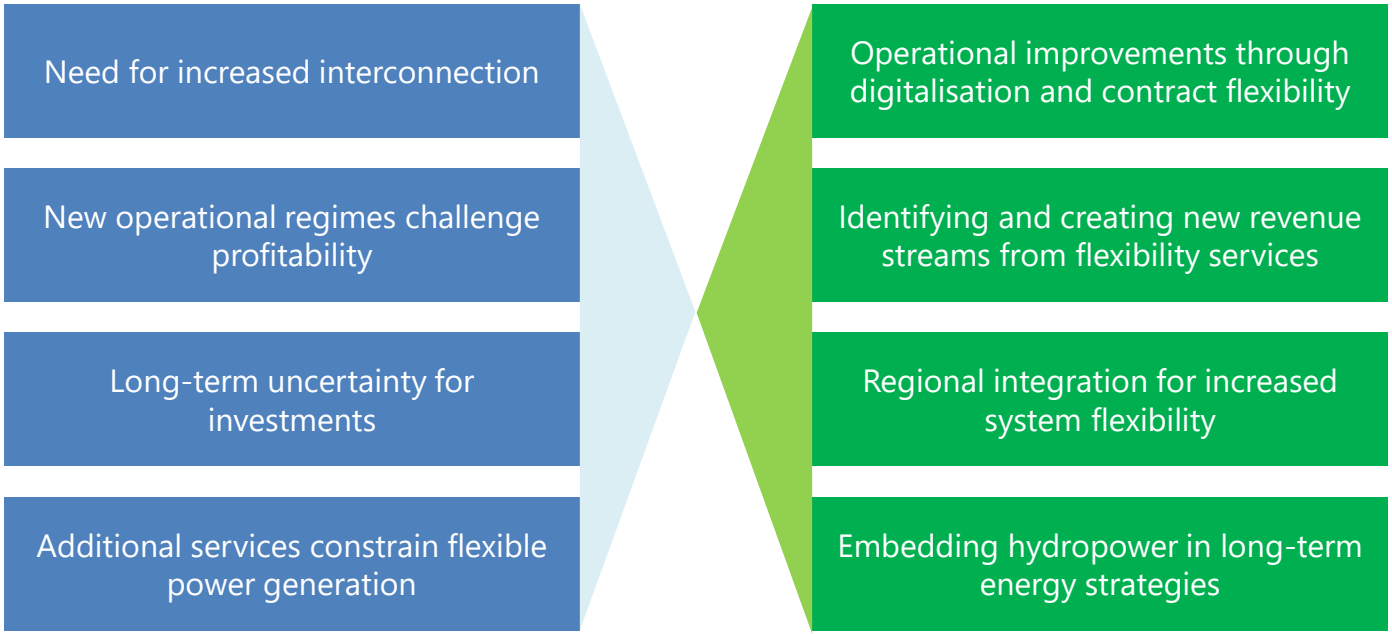


- Rising electricity demand ca. 4GW per annum
- Shift from energy-constrained to capacity constrained
- Northeast region already an example of shifting operational patterns
- Complex water management due to cascading hydro and cost-based dispatch



- Hydropower provides 60% of electricity
- Increasing flexibility requirements due to VRE
- Concession renewals open a window to foster modernisation
- Need for long-term certainty in policy support addressed through 2050 strategy

From challenges to opportunities



Main takeaways

- Hydropower can play a key role to meet energy transition goals, providing cost-effective flexibility to integrate solar & wind
- Improved and resilient hydropower will be key to accommodate rising VRE shares
- Increased coordination with other flexibility resources such as stronger interconnection and battery storage will be necessary to maximise the system value of hydropower
- Policies and market reforms need to focus on de-risking new investment, maintaining existing assets & giving value to flexibility
- The IEA will continue to provide policy guidance to countries to unlock the huge potential of hydropower