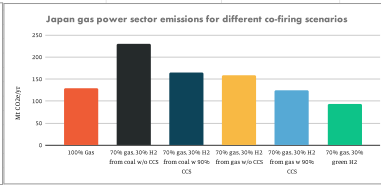
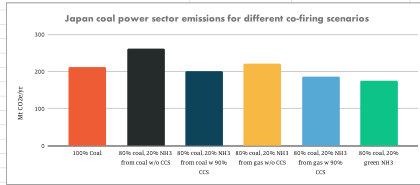
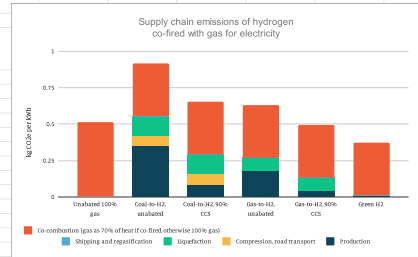
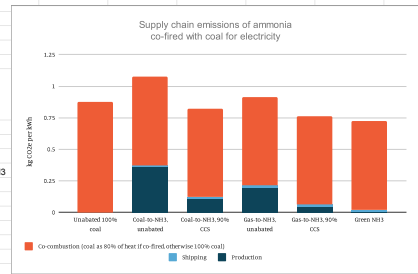


coal and gas supplying 26% (243 TWh) and 27% (252 TWh) of power in Japan in 2030  
 Orange cells denote steps whose emissions are accounted for by another value reported in the same column

(All units in kg CO <sub>2</sub> / kWh electricity generated in Japan)							
	Unabated 100% coal	Coal-to-NH <sub>3</sub> , unabated	Coal-to-NH <sub>3</sub> , 90% CCS	Gas-to-NH <sub>3</sub> , unabated	Gas-to-NH <sub>3</sub> , 90% CCS	Green NH <sub>3</sub>	
Production	0	0.36	0.11	0.2	0.049	0.009	
Shipping	0	0.013	0.013	0.013	0.013	0.013	
Co-combustion (coal as 80% of heat if co-fired, otherwise 100% coal)	0.876	0.701	0.701	0.701	0.701	0.701	
Total	0.876	1.074	0.824	0.914	0.763	0.723	
Carbon intensity relative to unabated coal	1	1.226027397	0.9406392694	1.043378995	0.8710045662	0.8253424658	
Japan emissions from coal power sector (Mt CO <sub>2</sub> /yr)	212.868	260.982	200.232	222.102	185.409	175.689	
(All units in kg CO <sub>2</sub> / kWh electricity generated in Japan)							
	Unabated 100% gas	Coal-to-H <sub>2</sub> , unabated	Coal-to-H <sub>2</sub> , 90% CCS	Gas-to-H <sub>2</sub> , unabated	Gas-to-H <sub>2</sub> , 90% CCS	Green H <sub>2</sub>	
Production	0	0.35	0.088	0.18	0.044	0.007	
Compression, road transport	0	0.07	0.07	0	0	0	
Liquefaction	0	0.133	0.133	0.087	0.087	0.002	
Shipping and regasification	0	0.003	0.003	0.003	0.003	0.003	
Co-combustion (gas as 70% of heat if co-fired, otherwise 100% gas)	0.513	0.359	0.359	0.359	0.359	0.359	
Total	0.513	0.915	0.653	0.629	0.493	0.371	
Carbon intensity relative to unabated gas	1	1.783625731	1.272904483	1.226120858	0.9610136452	0.7231968811	
Japan emissions from gas power sector (Mt CO <sub>2</sub> /yr)	129.276	230.58	164.556	158.508	124.236	93.482	



	kWh electricity required in Australia	Steps included	Notes
Green NH3 for coal co-burning (20% NH3) to produce 1 kWh in Japan	0.84	production (no added liquification needed)	
Green H2 for gas co-burning (30% H2) to produce 1 kWh in Japan	1.122	production (0.918 kWh), liquification (0.204 kWh)	Larger than the corresponding NH3 electricity input needed to produce 1 kWh in Japan, given higher H2 % by heat fraction needed, added liquification needs, and the fact that H2->NH3 requires little electricity relative to electrolyser
	TWh of electricity	TWh of electricity (rounded)	
Generation needed for NH3 co-burning with coal	204.12	204	204
Generation needed for H2 co-burning with gas	282.744	283	283
Total Australia 2021 generation	267	267	
Total Australia 2021 electricity from wind + solar	61	61	

**Old labels:**  
Green NH3 for coal co-burning (20% NH3) to produce 243 TWh in Japan  
Green H2 for gas co-burning (30% H2) to produce 252 TWh in Japan  
Australia national annual electricity generation, 2021  
Australia national annual electricity generation from wind and solar, 2021

The bar chart compares the electricity requirements for hydrogen and ammonia co-burning against Australia's current electricity generation. The y-axis represents TWh of electricity, ranging from 0 to 300. The x-axis lists four categories. The bars are colored as follows: orange for NH3 co-burning with coal, red for H2 co-burning with gas, dark blue for total 2021 generation, and green for wind and solar. A small blue square is present below the x-axis labels.

Category	TWh of electricity
Generation needed for NH3 co-burning with coal	204
Generation needed for H2 co-burning with gas	283
Total Australia 2021 generation	267
Total Australia 2021 electricity from wind + solar	61

H2 and NG losses per day of transoceanic shipping			
	H2 losses	NG losses	
	Units in tank	Units in tank	
Day 1	100	100	
Day 2	99	99.9	
Day 3	98.01	99.8001	
Day 4	97.0299	99.7002999	
Day 5	96.059601	99.6005996	
Day 6	95.09900499	99.500999	
Day 7	94.14801494	99.401498	
Day 8	93.20653479	99.3020965	
Day 9	92.27446944	99.20279441	
Day 10	91.35172475	99.10359161	
Day 11	90.4382075	99.00448802	
Day 12	89.53382543	98.90548353	
Day 13	88.63848717	98.80657805	
Day 14	87.7521023	98.70777147	
Day 15	86.87458128	98.6090637	
Day 16	86.00583546	98.51045464	