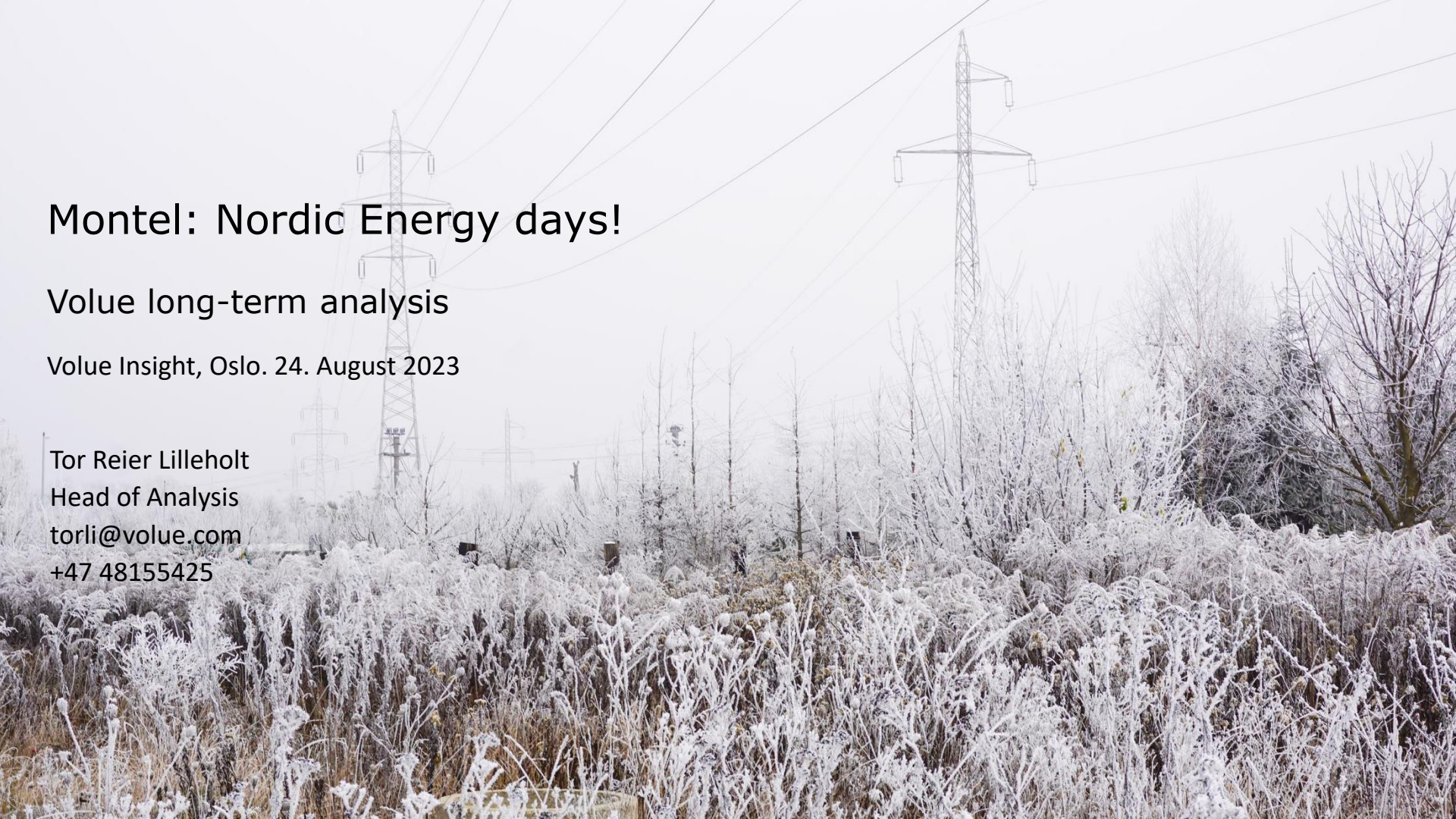


Montel: Nordic Energy days!

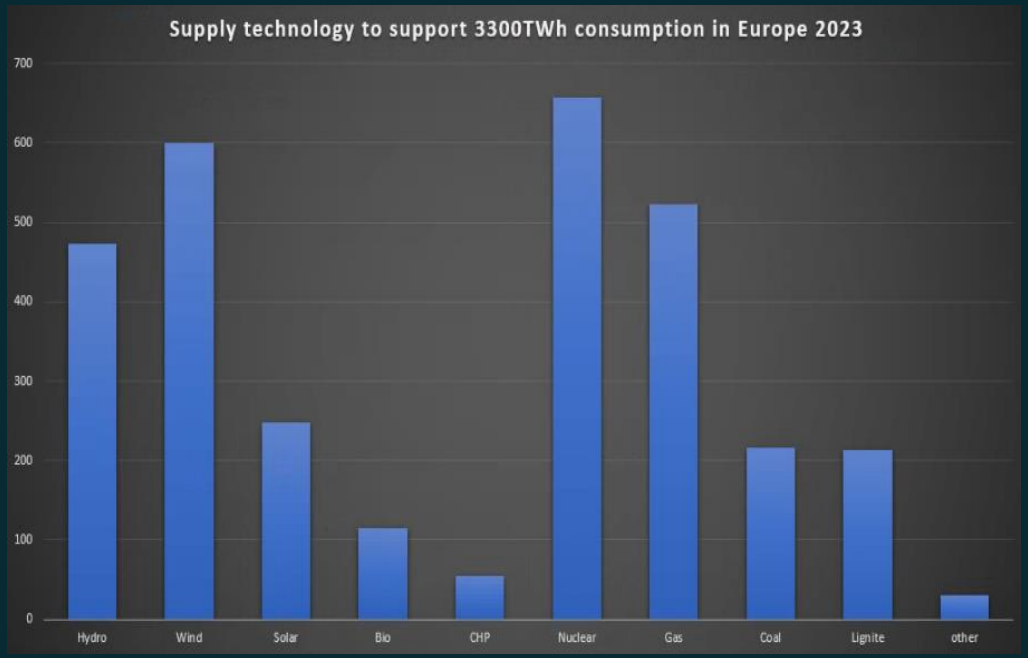
Volue long-term analysis

Volue Insight, Oslo. 24. August 2023

Tor Reier Lilleholt
Head of Analysis
torli@volue.com
+47 48155425

European power Balance 2023:

The green shift might soon reach 50% share!



Supply in Europe:

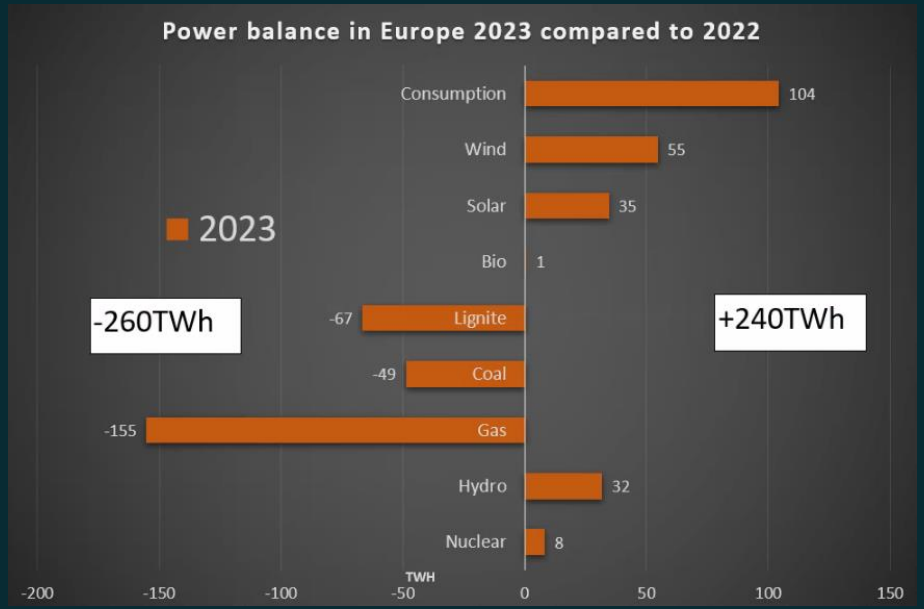
- Renewable close to 1500TWh and might reach 50% of total production next year
- Nuclear is the highest contributor in Europe with 650TWh
- Wind is the second strongest technology, and Offshore wind has around 15% share of the total wind production
- Solar production has the highest growth increase of almost 20% from last year.

- For 2023 we see more than 100TWh reduction in consumption and 100TWh new renewable production leading to more than 200TWh less thermal production this year.
- Gas is a strong contributor and very important for flexible production.
- Still more than 400TWh of coal and lignite production left in the production mix. We expect coal production close to zero during the next 10 years.

Europe is getting greener in 2023

Fundamental changes will be a game changer in 2023!

Today's assumption based on fundamental forecasts



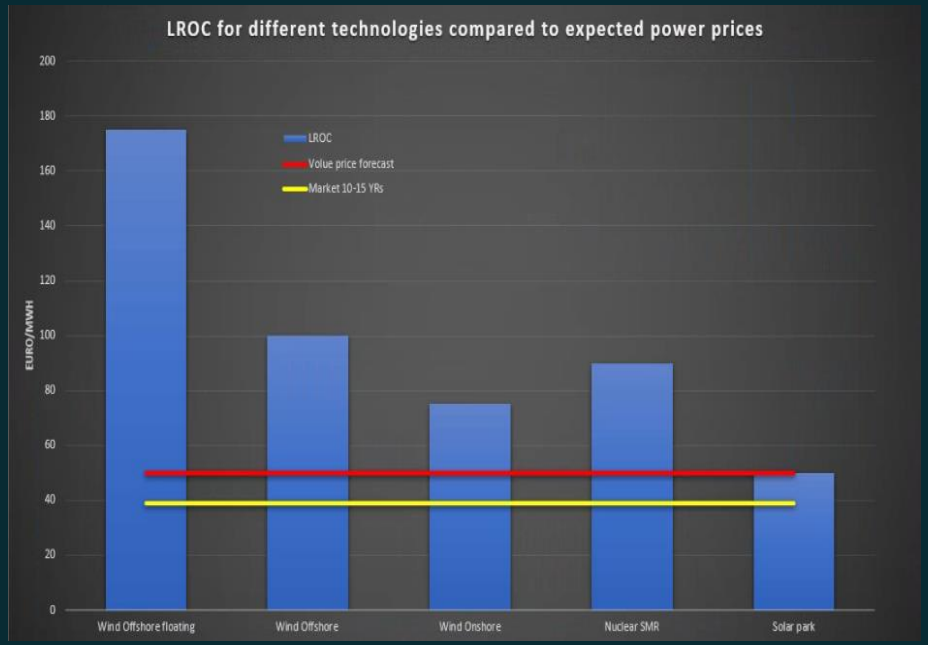
2023 will be very different from 2022:

- Consumption revised significantly down.
- New renewable investments 17000MW wind installations (70TWh) and 30000MWp solar installation (30TWh).
- Nuclear struggle to deliver according to available capacity in France. Germany closed the last 3 units in April (33TWh).
- Coal takes more of the reduction as SRMC gas is falling below SRMC coal and significant fuel switching happens.

- We might see a 250TWh reduction in thermal production as new renewable production and lower consumption will lower the need for thermal supply.
- On track with 130TWh reduction so far this year.

LCOE for different technologies based on our June 2023 edition:

There aren't a lot of "in the money" investments!



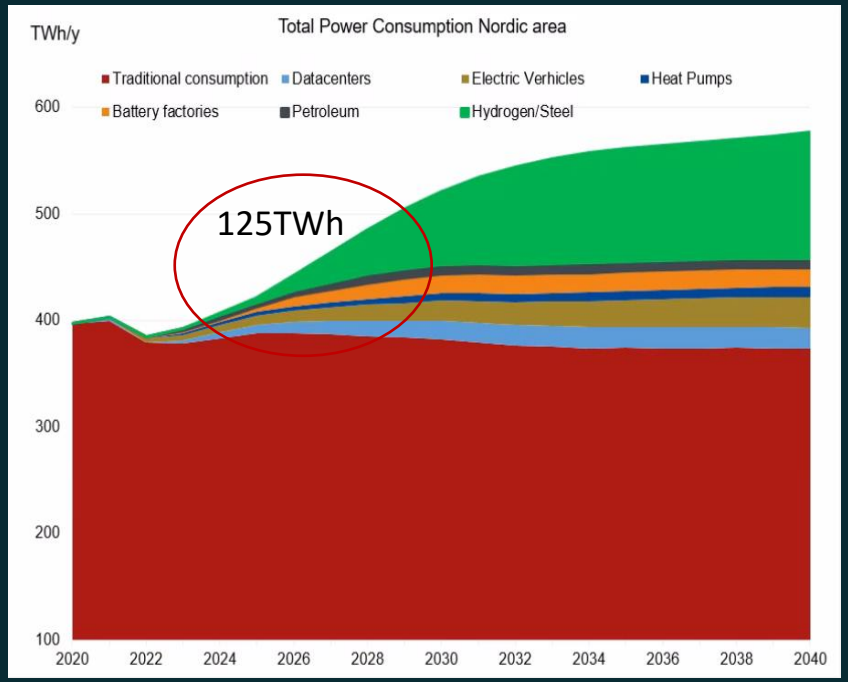
Indications for today's LCOE:

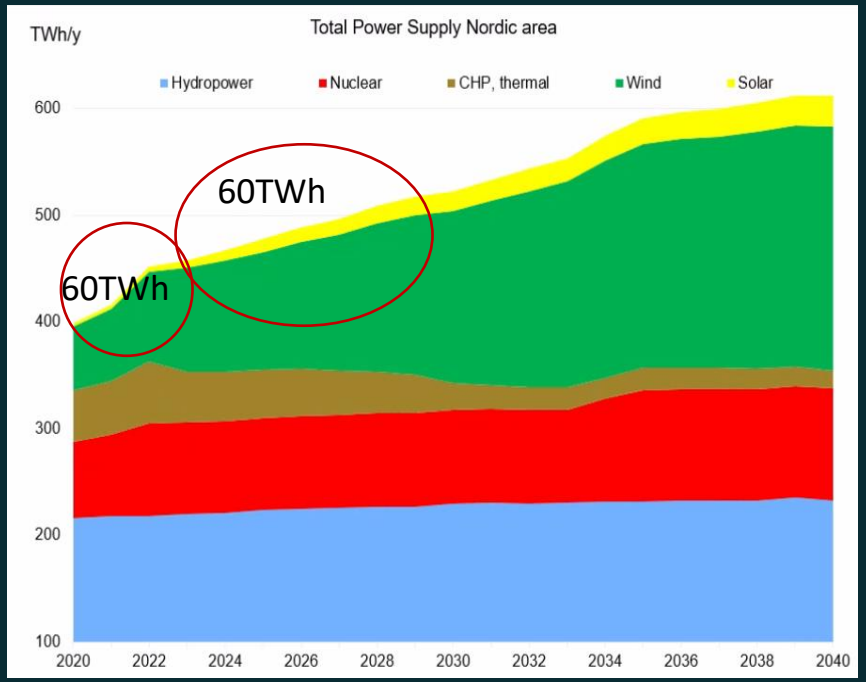
- General:
  - Major increase in interest costs and raw material and service costs ~close to 30-40% increase of costs in 2 years.
  - A lot of variations for different projects across Europe.
- Floating Offshore Wind:
  - Hywind Tampen budget from 5.2 to 7.4 billion in 2 years.
- Offshore Wind:
  - Trollvind postponed due to costs and other reasons
  - Auctions above 100€/MWh in the UK/US
- Onshore wind:
  - German auctions increased from 58€ 2 years ago to 73€ this year with only 50% of the offered volumes sold.
  - UK project with 2250h to 83€/MWh
- Solar parks on the ground:
  - ~50€/MWh after ~30% cost increase (Remember the profile deltas)
- Volue Insight expect long-term prices at ~50€/MWh
- Market prices for a 10-15year contract (2025->) ~40€/MWh with a falling tendency out in time.

The green shift triggers a race on both sides!

Nordic: 2025-2030 the consumption may run faster than production.....what about investment incentives? All areas will see a weaker power balance in the next 5-10 years.

Remember: the green shift is a commitment to climate change and not to meet low prices for the citizens and secure the industry





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Nordic power balance: Oversupply in front and long-term, balance near 2030

Year	Hydro-power	Nuclear	Wind onshore*	Wind Offshore*	Solar power	CHP	Thermal	Consumption	Net exports
2020	216,0	86,4	55,1	4,8	2,6	44,1	3,9	397,0	15,9
2021	217,8	72,0	63,3	4,8	3,3	43,4	6,5	403,4	7,7
2022	218,1	76,5	77,5	6,8	4,9	46,4	11,3	384,8	56,7
2023	219,7	86,9	88,3	9,0	7,0	38,6	8,8	392,7	65,5
2024	220,9	86,4	94,3	10,1	9,4	37,8	8,5	406,6	60,8
2025	223,7	85,9	98,6	12,1	11,7	38,3	6,8	421,3	55,9
2026	225,3	86,1	104,1	15,0	13,1	37,9	6,6	442,2	46,0
2027	226,0	86,4	109,0	18,4	14,6	35,1	6,5	463,7	32,3
2028	226,6	86,4	115,7	23,0	16,0	33,0	6,3	484,6	22,4
2029	226,8	87,7	121,5	28,3	17,3	30,3	5,5	504,5	12,8
2030	230,1	87,6	126,8	33,9	18,5	24,1	1,2	520,6	1,7
2031	231,0	87,6	131,9	40,6	19,6	21,4	1,0	533,9	-0,8
2032	230,1	87,6	136,4	47,2	20,8	20,7	0,7	544,3	-0,9
2033	230,5	87,5	139,1	54,0	21,9	20,0	0,4	551,3	2,1
2034	231,7	87,5	141,7	61,4	23,0	19,6	0,2	557,0	8,1
2035	231,9	96,4	143,5	66,1	24,1	20,6	0,2	561,0	21,8
2036	232,9	104,4	144,5	69,1	25,1	20,0	0,2	564,1	32,1
2037	232,6	104,4	145,2	71,6	26,1	19,6	0,2	567,2	32,6
2038	232,8	104,4	146,4	74,9	27,1	19,2	0,2	570,3	34,8
2039	235,1	104,4	147,7	78,0	28,2	18,6	0,2	572,8	39,5
2040	233,0	104,4	149,3	79,9	29,1	16,3	0,2	576,5	35,8

- An average of 10 TWh new renewable productions added per year towards 2030
- The consumption might increase as much as 20TWh per year as an average until 2030.
- Until 2040 we see a lower increase in consumption and with 10TWh per/year in increased new renewable production the surplus of power in the balance will start increasing again.
- Without offshore wind success we might stay with a deficit in the future
- Main contribution:
  - Finland: Onshore wind
  - Sweden: Consumption
  - Denmark: Consumption, offshore wind
  - Norway: Consumption

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Norway: Oversupply in front and long-term, balance near 2030

Year	Hydropower*	Wind onshore*	Wind Offshore*	Thermal	Solar power	Total consumption*	Net exports
2020	135,0	9,8		2,4	0,1	138,4	8,9
2021	136,6	11,2		2,3	0,1	138,4	11,9
2022	137,0	14,6		2,7	0,4	133,1	21,5
2023	138,7	15,7	0,0	2,6	0,7	137,0	20,7
2024	140,0	15,7	0,0	1,6	1,2	143,3	15,1
2025	142,9	15,7	0,0	1,0	1,7	145,8	15,4
2026	144,2	15,7	0,0	0,8	1,9	150,1	12,4
2027	144,6	16,2	0,0	0,6	2,1	157,7	5,7
2028	144,9	18,6	0,0	0,4	2,4	165,3	1,0
2029	145,0	20,3	1,0	0,2	2,6	170,9	-1,8
2030	148,2	21,8	2,0	0,0	2,9	173,3	1,6
2031	149,0	23,1	3,5	0,0	3,1	174,3	4,4
2032	148,0	24,5	5,5	0,0	3,4	175,4	5,9
2033	148,3	25,6	7,0	0,0	3,6	176,0	8,5
2034	149,4	26,7	8,5	0,0	3,9	176,7	11,7
2035	149,5	27,3	10,1	0,0	4,1	177,3	13,7
2036	150,5	27,5	11,7	0,0	4,4	177,6	16,4
2037	150,2	27,9	12,3	0,0	4,6	177,9	17,1
2038	150,4	28,3	12,9	0,0	4,9	178,3	18,1
2039	152,7	28,6	13,5	0,0	5,1	178,5	21,4
2040	150,6	29,0	14,3	0,0	5,3	179,1	20,1

Consequences for onshore wind power:

1) The Fosen dispute has to be solved
2) Weak licensing - and not in my backyard
3) Increased LCOE by 30-40%,
4) Tax proposal
5) High offshore targets (wait and see)

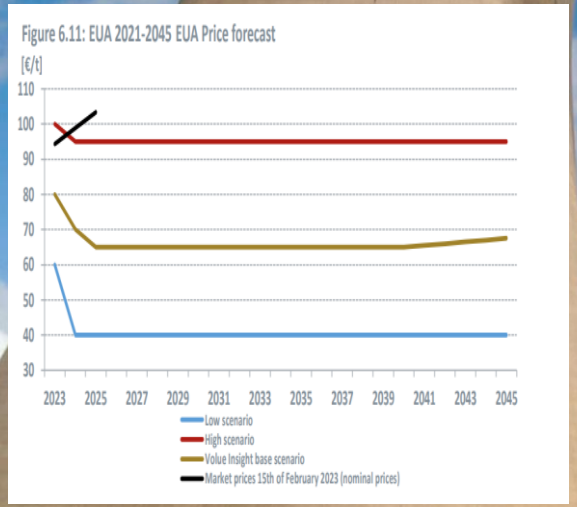
- No new Onshore wind power production next 5 years
- Only 10% Offshore wind power investment in 2040 compares to the goal of 30GW installations in Norway (~120TWh production)

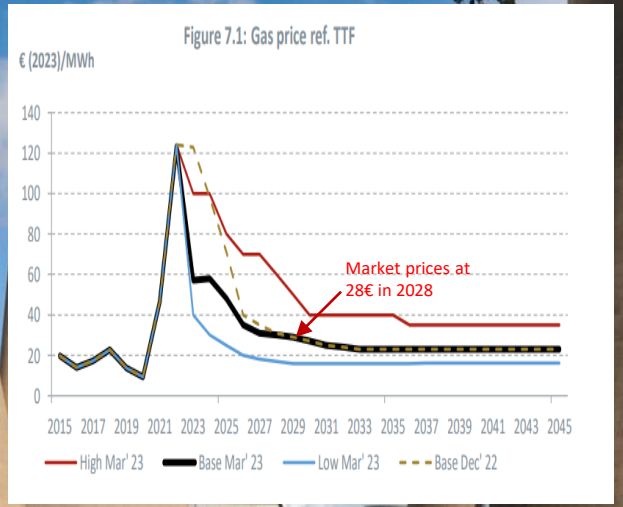
- Offshore wind power and power consumption do increase over the 2030s, but our base assumptions are below the low scenario from Statnett.

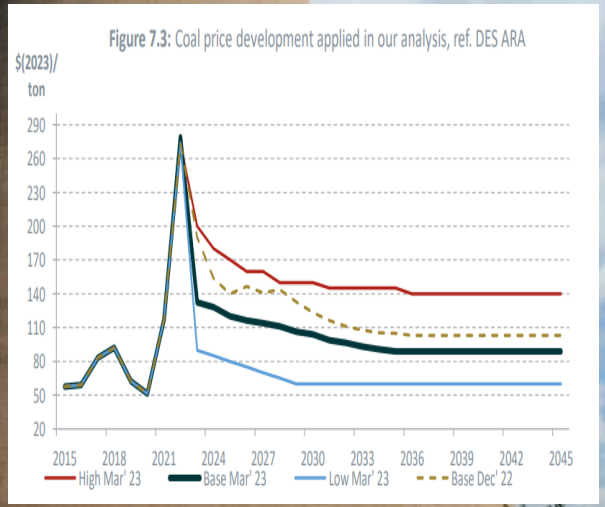
The Fuel effect on power prices:

Long term : 23€ ~SRMC gas 75€

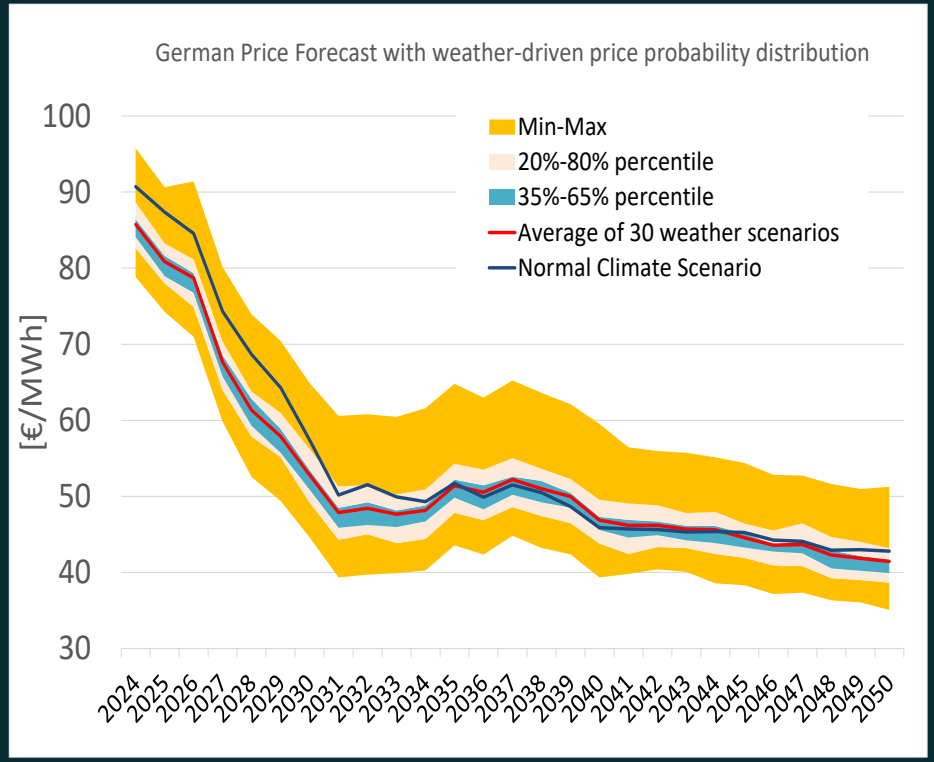
SRMC Coal 90€ but zero production ~2035







Power Price development Germany



Change of methodology June edition:

- Fast fall towards 50€, following the SRMC of gas downwards but simulations show a stronger deficit to the average SRMC.
- For the next 10 years The spread of 30 weather years shows lower prices than one normal weather run. More frequent collapsing hours due to more renewables.
- Further out we will see another mix in the power balance and ex. hydrogen will balance out the prices in high wind and solar periods.

Simulated European Area prices: 'Base' scenario, June 2023, €/MWh (2023)

Lowest prices*
(until ~2026)

Year	System	NO1	NO2	NO5	NO3	NO4	SE1	SE2	SE3	SE4	Finland	Jutland	Zealand
2021	62,3	74,7	75,1	74,6	41,1	35,0	42,5	42,6	66,0	80,5	72,3	88,1	87,9
2022	135,9	192,5	211,3	192,1	41,9	24,5	59,1	62,0	129,2	152,1	154,0	219,0	210,2
2023	71,7	78,1	78,6	77,8	60,1	53,8	60,3	59,9	71,0	74,2	77,6	92,9	86,6
2024	70,4	71,6	72,0	71,3	59,7	61,1	58,6	58,7	69,1	70,6	70,3	97,8	85,9
2025	68,9	69,7	70,2	69,6	64,0	65,2	61,9	62,0	68,2	69,5	69,7	89,5	83,1
2026	70,1	70,0	70,3	70,2	67,4	70,0	66,3	66,3	69,7	70,6	67,3	81,0	77,0
2027	63,3	63,7	63,9	63,7	62,9	63,8	60,8	60,8	62,1	63,0	60,0	68,0	64,7
2028	59,8	60,6	60,4	61,0	60,2	61,0	58,3	58,3	59,2	59,9	58,1	61,2	59,4
2029	57,6	58,0	57,6	58,2	58,0	60,5	56,7	56,6	57,3	58,0	57,5	58,2	56,3
2030	56,4	56,7	55,7	57,0	56,7	60,0	57,2	56,8	57,9	59,9	64,6	55,3	55,6
2031	50,6	50,8	49,6	51,3	51,1	54,8	52,4	51,8	53,0	54,2	61,4	48,3	49,4
2032	49,5	48,3	47,1	48,8	48,8	51,5	51,2	50,7	52,0	53,5	58,4	51,1	51,7
2033	48,3	47,2	45,9	47,5	47,5	49,6	50,1	49,6	51,0	52,3	56,9	50,4	51,5
2034	47,0	45,5	44,2	45,9	45,9	47,4	49,1	48,5	50,0	51,3	56,5	49,7	51,1
2035	46,6	44,6	44,2	44,9	44,9	46,4	46,5	46,3	46,5	52,0	47,0	54,1	53,5
2036	46,3	43,9	43,4	44,2	44,2	45,9	46,2	46,0	46,2	52,2	46,9	55,0	54,3
2037	45,7	42,7	42,2	43,1	43,1	44,8	45,9	45,6	45,9	52,5	46,9	56,0	55,6
2038	45,7	42,3	41,8	42,6	42,7	44,1	46,1	45,8	45,9	53,0	47,2	57,6	57,1
2039	43,7	41,0	40,6	41,2	41,3	42,3	44,1	43,8	43,9	50,0	45,7	54,0	53,6
2040	39,6	37,4	36,9	37,7	37,7	38,7	40,3	40,0	40,1	45,0	42,5	47,8	47,8

Year	Germany	France	UK	Belgium	Netherlands	Spain	Portugal	Austria
2021	96.8	109.2	137.6	104.1	103.0	111.9	112.0	106.9
2022	235.5	275.9	240.0	244.5	241.9	167.5	167.9	261.4
2023	88.2	87.9	100.6	88.2	88.2	73.6	73.6	88.2
2024	85.8	85.7	97.5	85.8	85.8	76.9	76.9	85.7
2025	80.9	80.4	92.8	80.9	80.8	72.6	72.6	80.9
2026	78.7	78.7	88.2	78.8	78.5	70.4	70.4	78.7
2027	67.7	66.3	71.8	67.6	67.4	60.8	60.8	67.7
2028	61.3	59.0	62.8	61.1	60.8	59.2	59.0	61.3
2029	57.9	55.3	59.2	57.5	57.0	56.8	56.2	57.9
2030	52.8	48.4	51.4	50.5	50.2	50.0	48.2	52.8
2031	47.9	43.8	45.1	45.2	45.0	46.1	43.7	47.8
2032	48.4	43.7	45.7	45.6	45.6	45.8	43.2	48.4
2033	47.6	43.0	44.7	44.7	44.7	44.3	41.9	47.6
2034	48.2	43.1	44.0	45.1	45.1	45.1	42.5	48.1
2035	51.4	45.2	46.2	47.3	47.4	47.2	44.5	51.4
2036	50.5	44.8	45.0	45.9	45.6	47.9	45.0	50.5
2037	52.2	45.6	47.1	47.7	47.2	48.3	45.2	52.1
2038	51.0	45.7	46.7	46.8	45.7	48.3	45.1	50.9
2039	50.0	44.4	44.7	46.0	45.0	47.4	44.3	49.9
2040	46.9	40.7	41.0	43.3	42.9	45.0	42.1	46.7

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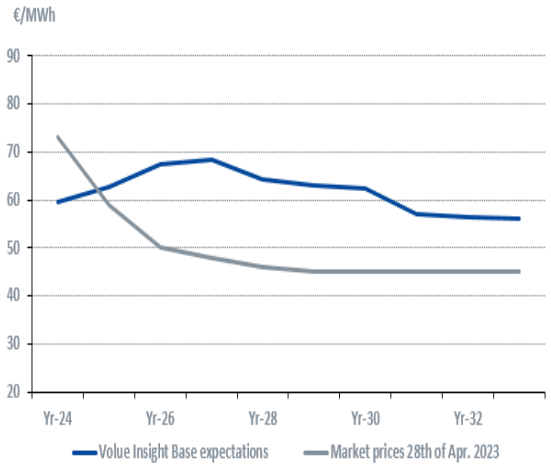
NP system prices 10 years contract 2024-2033: June-2023

Table 2.4: Our simulated prices vs. market prices for year-products as of 28th of Apr. 2023. All figures in nominal €/MWh.

Year	Volue Insight Base expectations	Market prices 28th of Apr. 2023	Deviation to market
Yr-24	59,4	73,0	-13,6
Yr-25	62,7	59,0	3,7
Yr-26	67,4	50,0	17,4
Yr-27	68,3	48,0	20,3
Yr-28	64,4	46,0	18,4
Yr-29	63,0	45,0	18,0
Yr-30	62,6	45,0	17,6
Yr-31	57,0	45,0	12,0
Yr-32	56,6	45,0	11,6
Yr-33	56,1	45,0	11,1

Please note a major explanation:
Volue Insight Base expectations are simulated power prices as presented in our June 2023 LTP-report, applying Volue Insight year-by-year expectations to coal, gas and EUAs, and converted to nominal values.



Note! Today's market price for the same 10-year contract is 10€ lower.

2024-33:

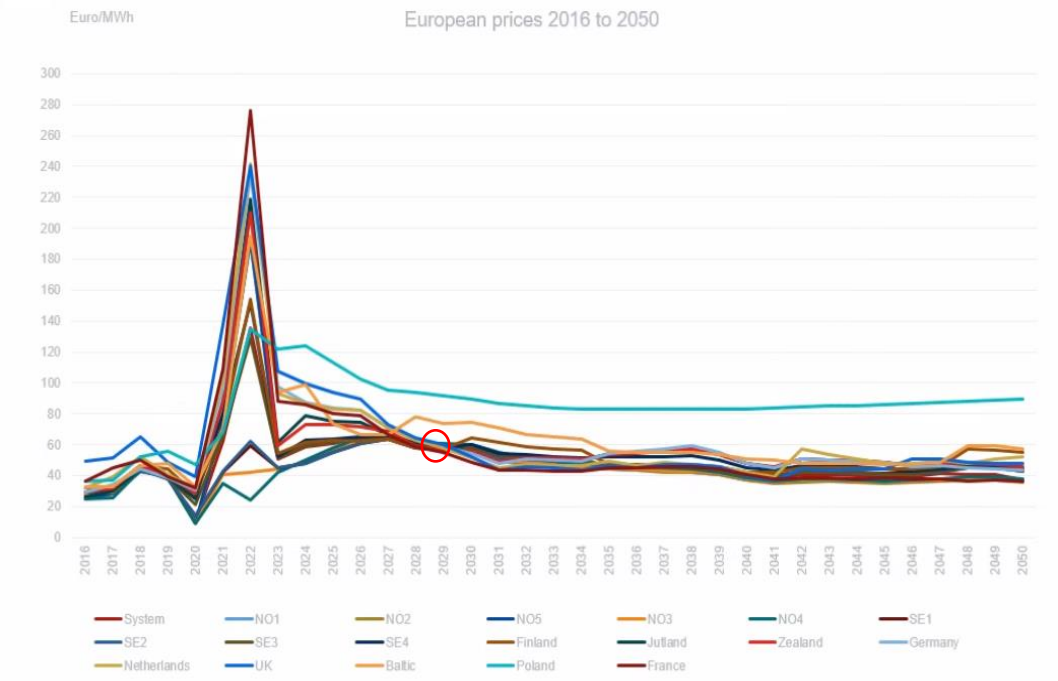
- Our fuel and European price expectations are well below market
- We have a bit conservative view on both supply from new renewable and consumption from new industries as grid extensions might be a limitation.
- Despite this, our NP system price expectations are well above market for the next 10 years.

My wonder is why NP market prices are much lower than our expectations at the same time as the market is more bullish on important fundamental input.

I think this is worth some reflection:

- How important will the fuel prices in Europe be?
- How strongly will NP connect to Europe?
- How much does the power balance in NP area mean for the prices?
- Are the financial market at Nasdaq representative for the fundamental delivery in the period?

European prices 2016-2050: June 2023



- **2030:**

With normal weather conditions we might see most of the European prices gathered at the same level around 60€ except strongly thermal driven areas like Baltic and Poland.

- **2030-2050:**

The prices are spreading out more as the Nordic areas build up more oversupply again. UK and France might follow as large exporters.

Thank you for your attention!

Tor Reier Lilleholt
Head of analysis
torli@volue.com
+47 48155425