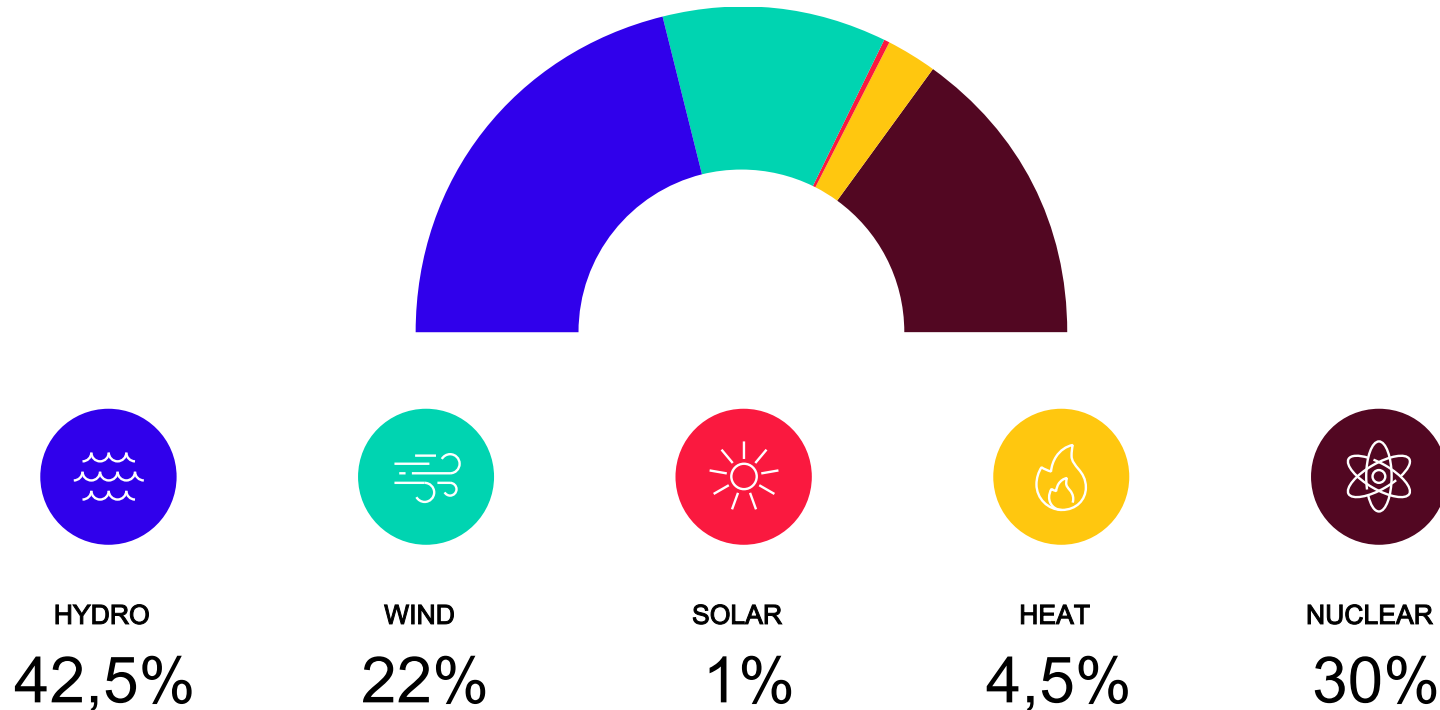


# Nuclear in the electricity mix

CET2024, September 19 2024

Mattias Jonsson

# Electricity mix Sweden 2023



# Four scenarios with different demand levels and generation mix

## Electricity consumption Sweden 2045

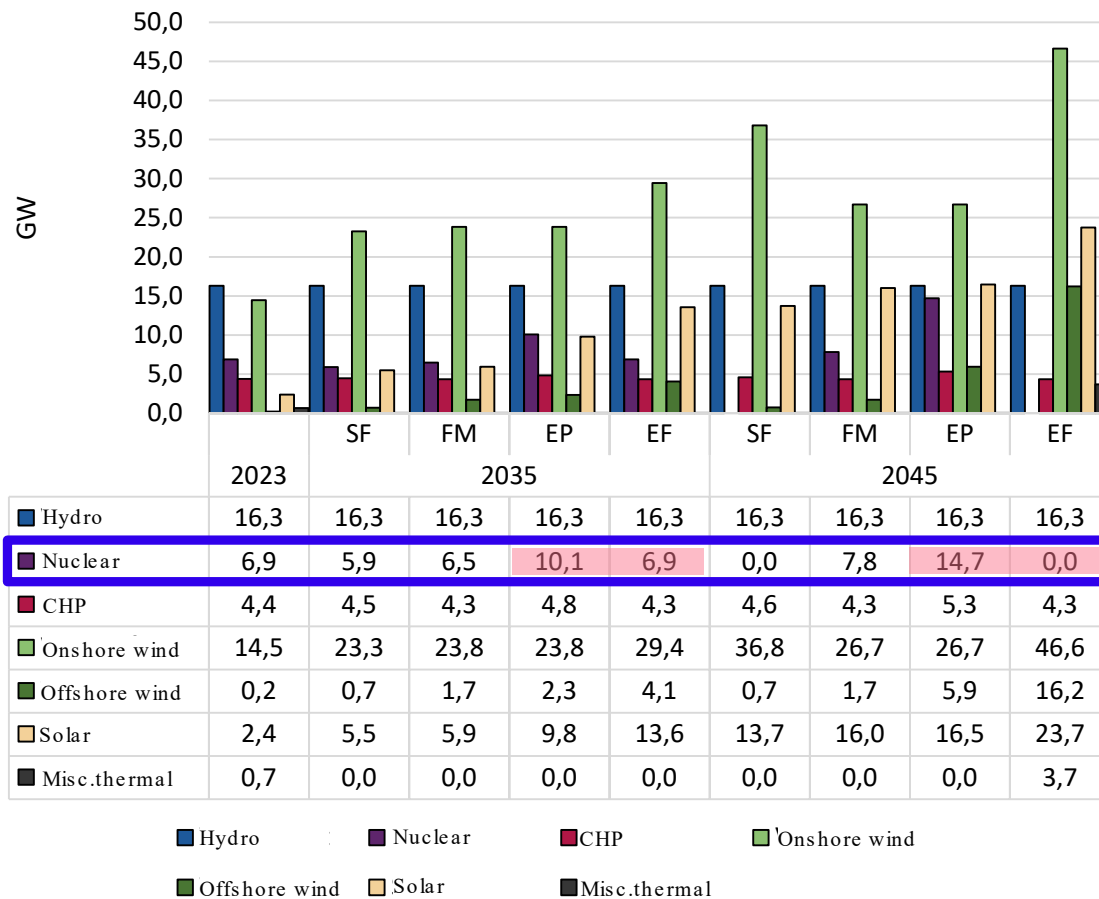
- SF – 200 TWh, FM – 250 TWh
- EP/EF – 343 TWh

## Roadmaps Mixed (FM) och Electrification dispatchable (EP)

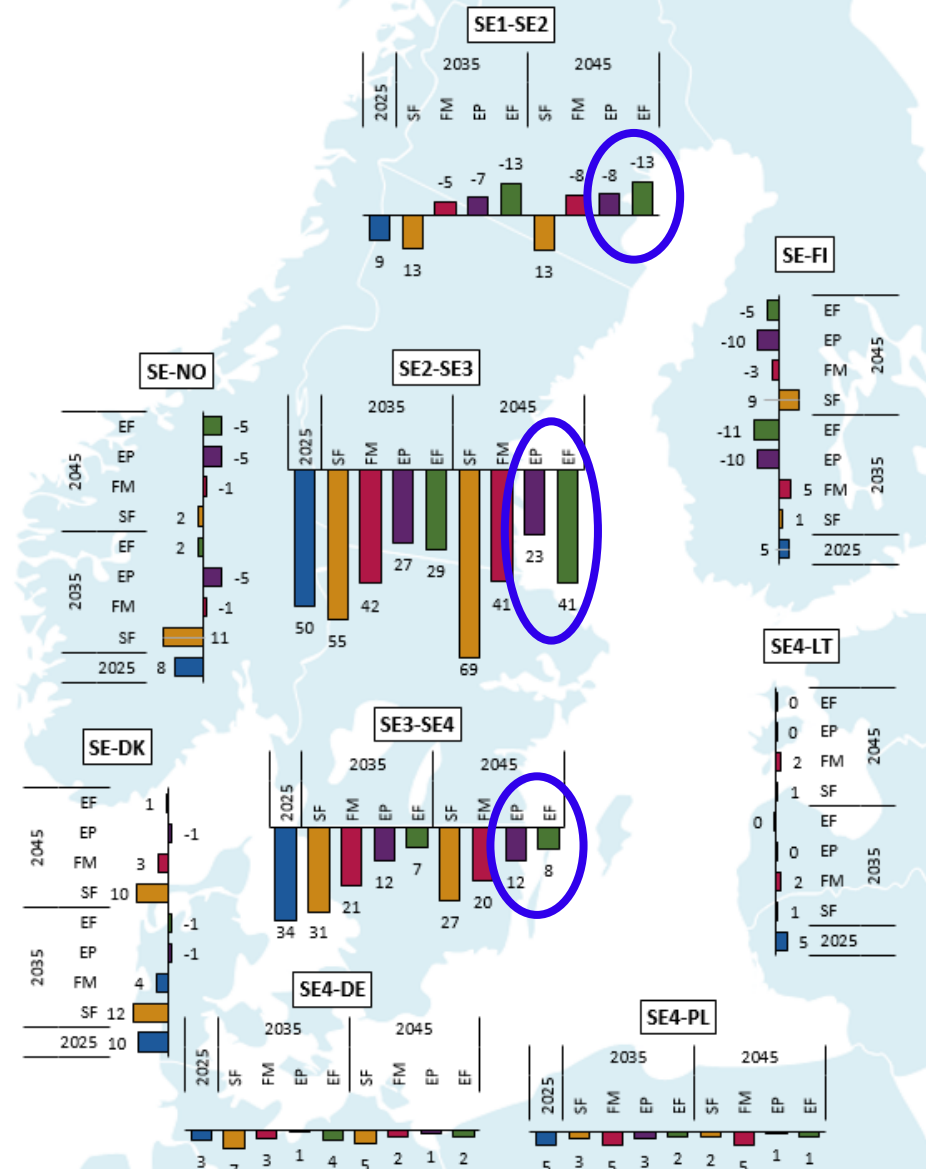
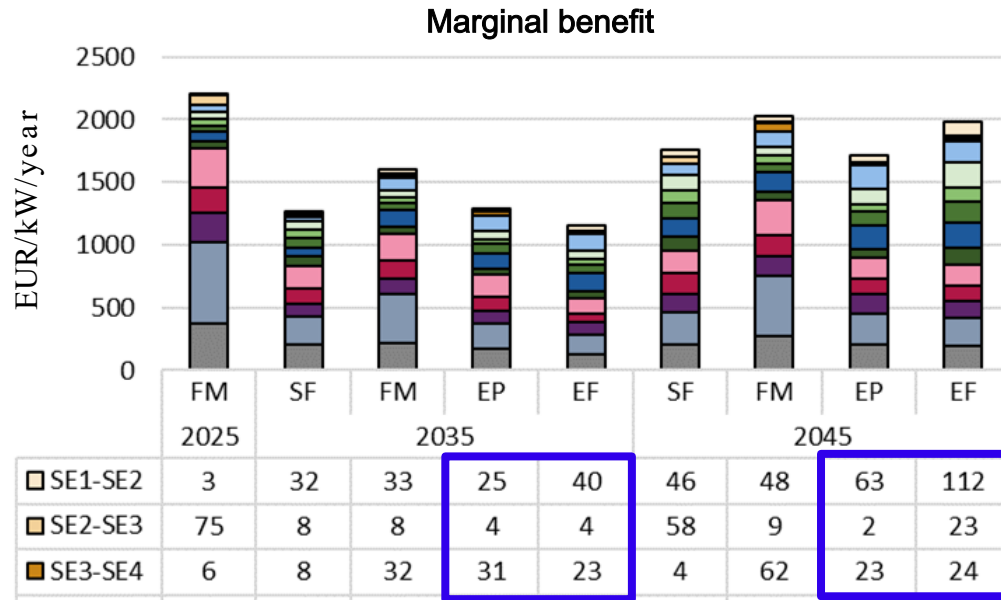
- All fuel types remain
- New nuclear included
- Life extension of existing reactors (only 3 newest in FM)

## Nuclear in FM - och EP-scenarios year 2045

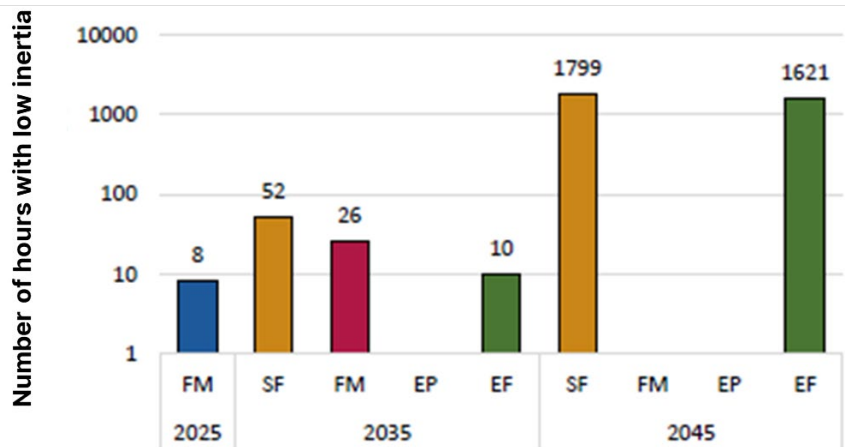
- FM: 7,8 GW of which 2,3 GW in SE1
- EP: 14,7 GW of which 4,2 GW in SE1



# Net flows and marginal benefit for increased network capacity



# Adequacy, inertia and reserves



## Adequacy – Loss of Load Expectation (LOLE)

LOLE Sweden	2025		2045		
	SF	FM	EP	EF	
<b>LOLE (h/år)</b>					
No flexibility	0.4	110	285	1815	1863
F1: half of hydrogen flexible		48	29	49	285
F2: all hydrogen flex		18	10.1	0.1	13
F3: some industry/EV		0.5	5.8	0.0	0.2
F4: data centres		0.2	4.7	0.0	0.1

Estimated reserve requirement (MW) to manage forecast error in residual load

2025		2035		2045				
FM	SF	FM	EP	EF	SF	FM	EP	EF
1102	1437	1524	1700	2054	2201	1797	2150	3560

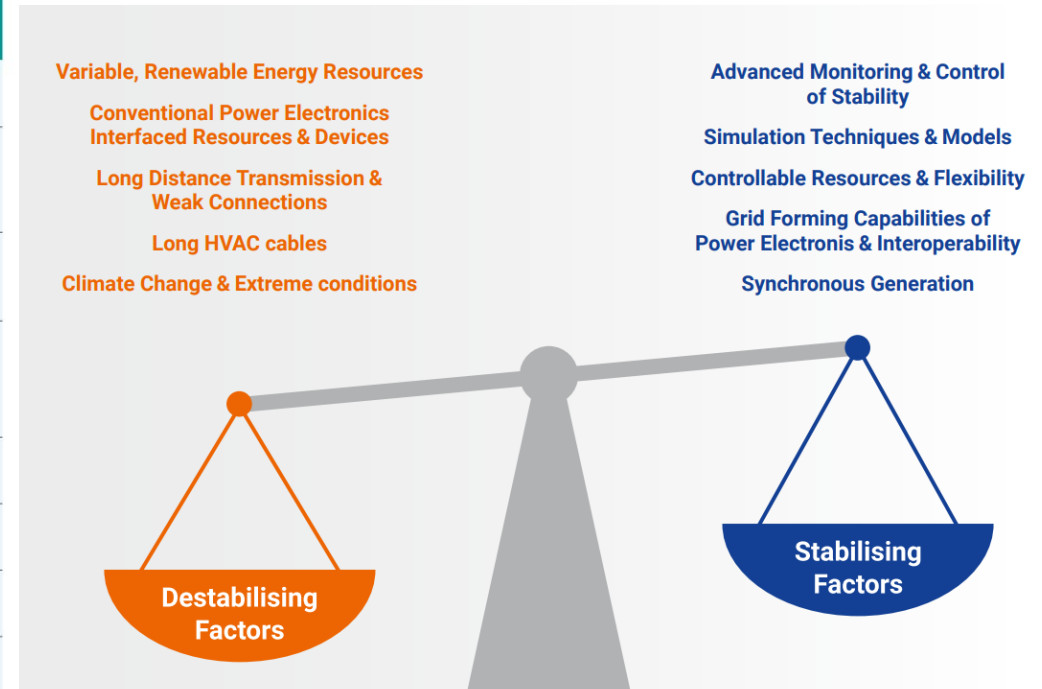


# A few important considerations for the development of new nuclear

- Geographical placement
- Size and availability
- Ancillary services
- Grid code compliance
- Implementation

# “All stakeholders have to collaborate and contribute to keeping the system stable”

Stakeholders	Grid / System operators	Policy-makers	RD&I Institutions	Ancillary Service Market Operators	Generators	DSOs*	Other Sectors	Manufacturers & Vendors
<b>Solutions</b>								
Modelling and tools	■■■	■	■■■		■■■	■■		■■■
Develop and integrate new stability solutions in system development	■■■	■■■	■■	■■	■■■	■		■
Pan-EU stability management process	■■■	■■■		■■				
Inter-regional real-time data exchange and communication, cyber security	■■■	■■	■■			■■■		
Standards and interoperability	■■■	■■■	■■	■■■	■■■	■■■		■■■
Grid code requirement	■■■	■■■	■■	■■■	■■■	■■■		■■■
Capabilities from flexible resources	■■■	■	■■	■■■	■■■	■■	■■■	■■■
Market development and liquidity	■■■	■■■		■■■		■		
Responsibility (TSO-RCCs, TSO-DSO, cross-sector, market operators, generators) in ensuring the power system stability	■■■	■■■		■■	■■	■■	■■	



Source: Entso-e Position paper: “Stability Management in Power Electronics Dominated Systems: A Prerequisite to the Success of the Energy Transition”, June 2022.

Thank You!