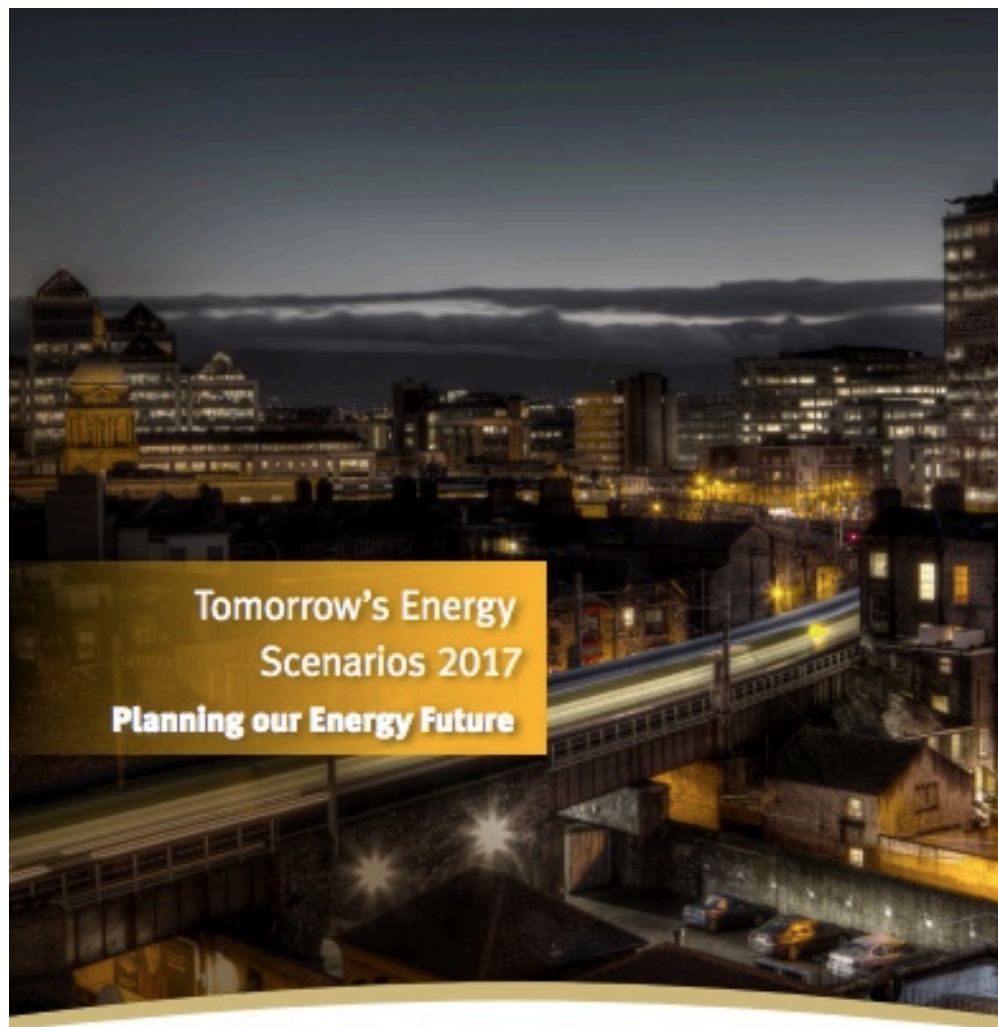


# Ireland's electricity to 2050

A rational pathway to zero carbon



**Tomorrow's Energy  
Scenarios 2017  
Planning our Energy Future**





Energy for  
generations



# Ireland's low carbon future

— Dimensions of a solution



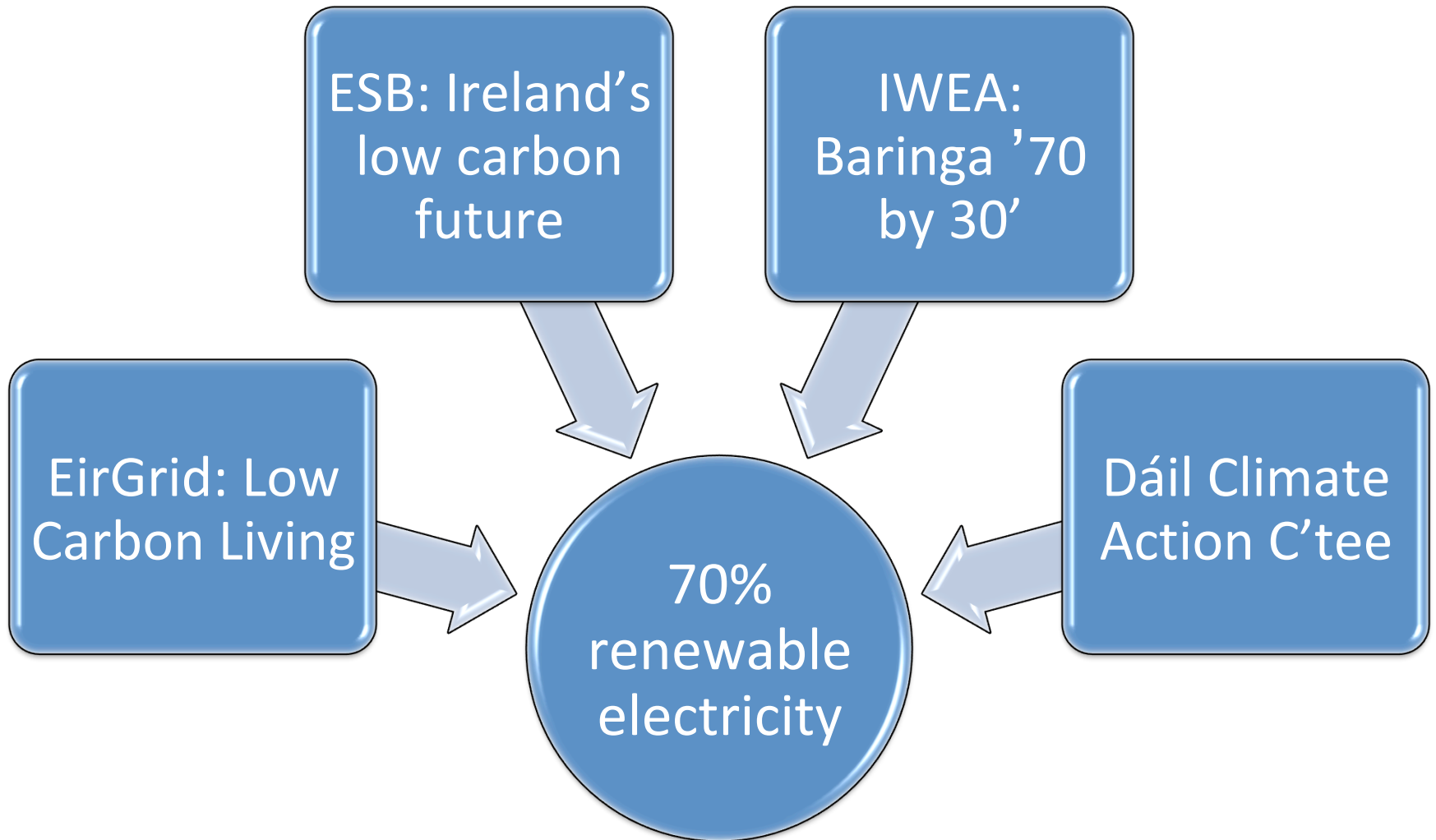
# 70 by 30



**A 70% Renewable  
Electricity Vision for  
Ireland in 2030**

October 2018

# Common vision for 2030



# Base Case

- Fully implement Low Carbon Living to 2040
- Maintain RE % and CO<sub>2</sub> emissions to 2050
- Replace plant after design life + 5 years

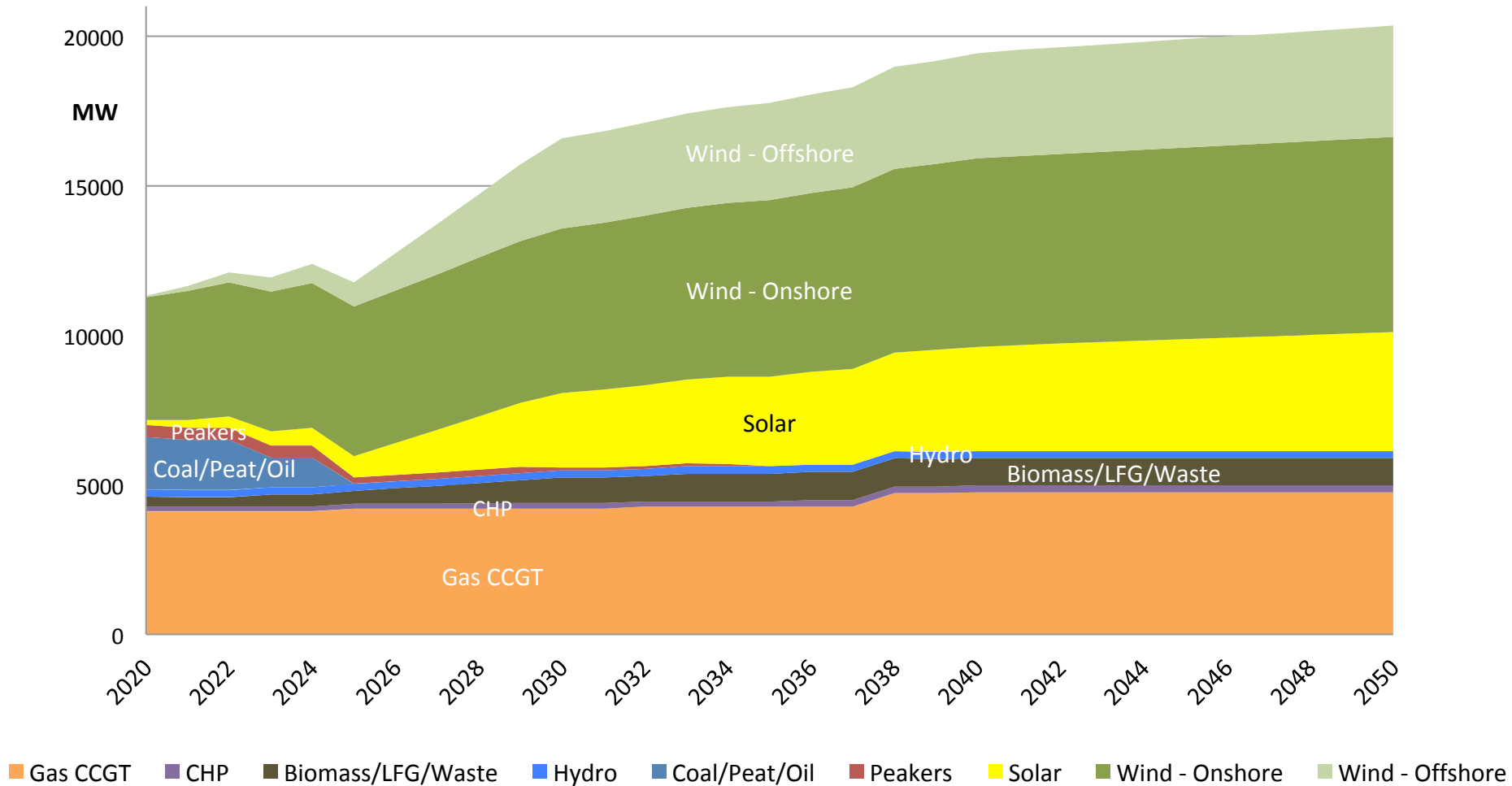


# EirGrid Heat & Transport forecast

Demand Component Information	Steady Evolution	Low Carbon Living
Total Data Centre Capacity (MVA)	1,100	1,950
Total number of Electric Vehicles	606,000	785,000
Total % of Vehicles which are Electric	26%	33%
Total number of Heat Pumps	423,000	529,000
Total % of Households with Heat Pumps	20%	25%
Total Demand (TWh)	38.3	45.8

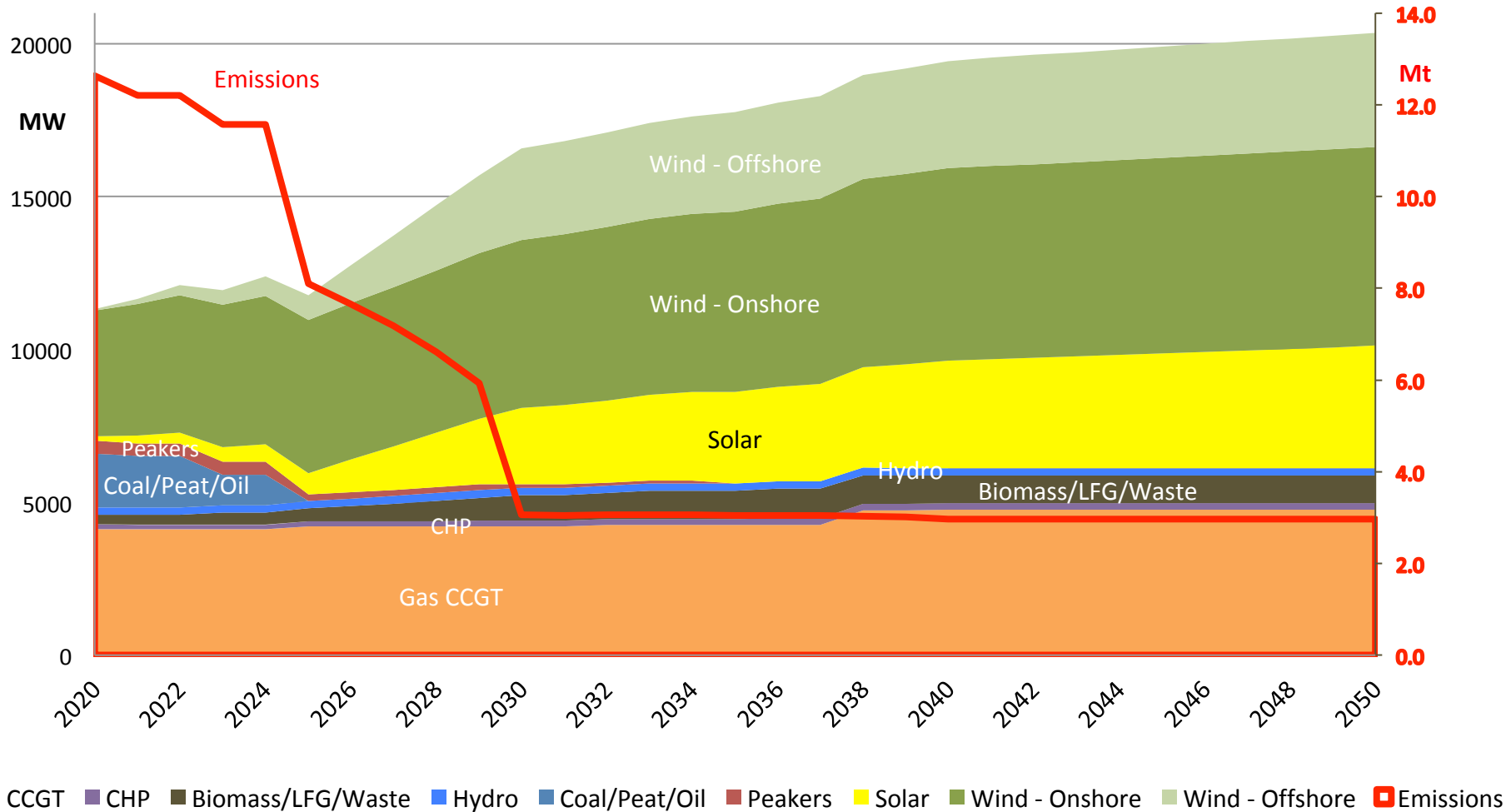
Table 8: Summary of demand components in the 2040 scenarios.

# EirGrid: 'Low Carbon Living' portfolio to 2050





# EirGrid: 'Low Carbon Living' portfolio to 2050



# Low Carbon Living 2020-50

- Cost of Capital €36 billion
- Cost of Energy €120 billion
- CO<sub>2</sub> total 130 million tons
- CO<sub>2</sub> in 2050 3 Mtons (80% less than 1990)

# We need everything ( and then some )



MaREI

# We need everything (*but not nuclear?*)

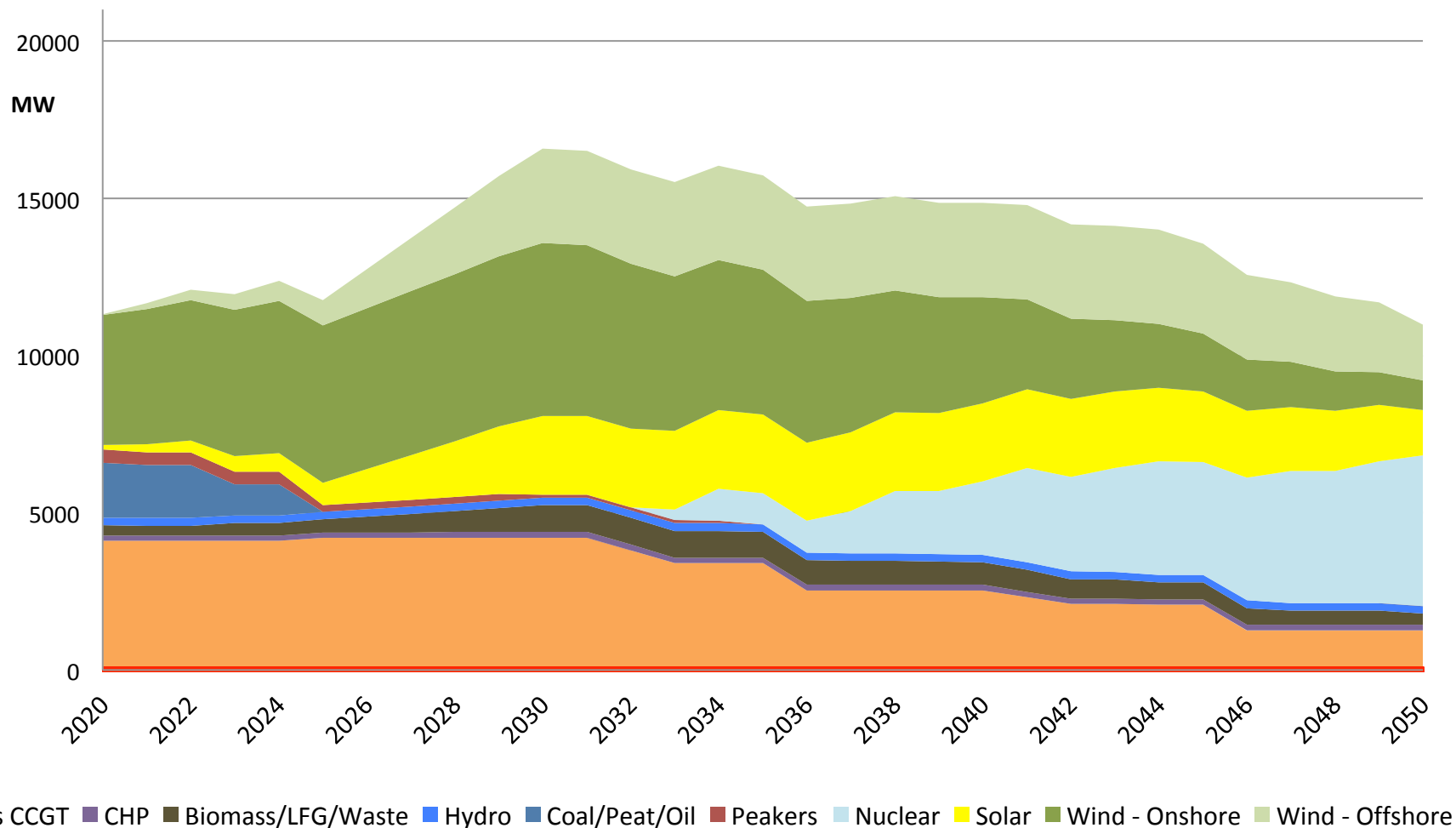


MaREI

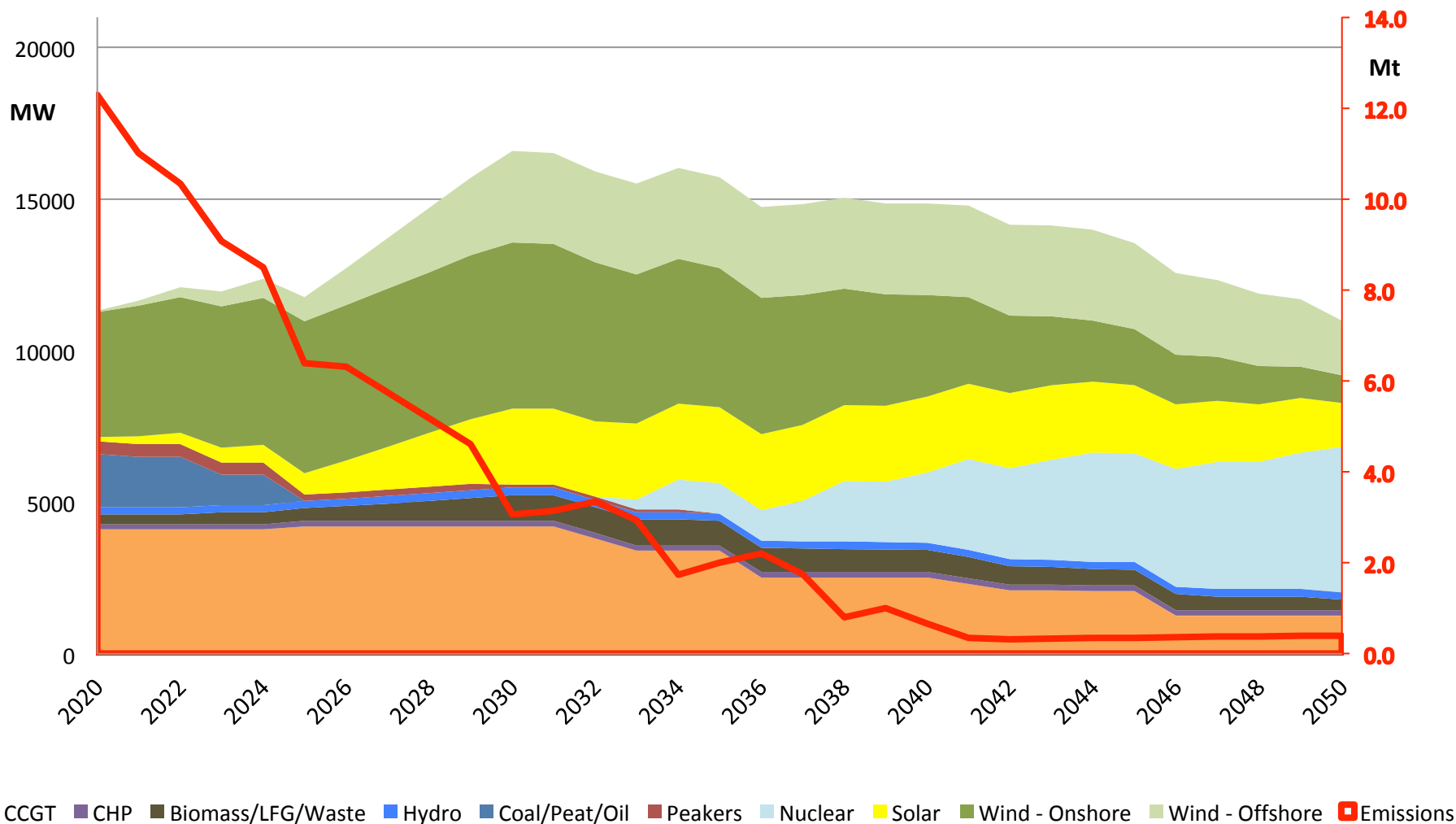
# We need everything (*why not nuclear?*)

- Includes CCS (also not permitted)
- EirGrid: Nuclear 'No' *because of bans*
- ESB: Nuclear 'No' because *they're too big*
- *Our study includes Nuclear and RE*

# Sample Nuclear + RE portfolio

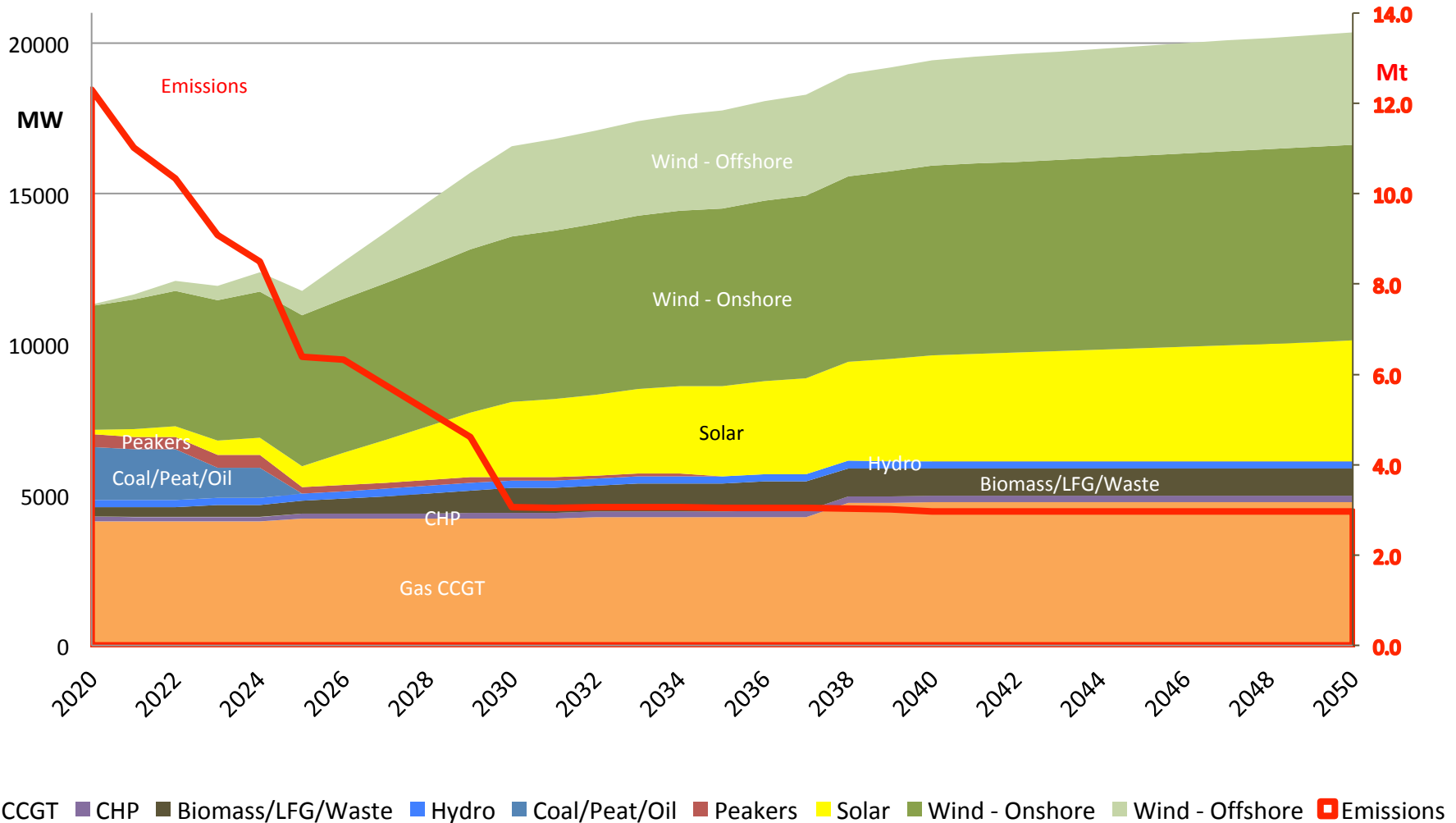


# Sample Nuclear + RE portfolio





# Reminder: 'Low Carbon Living' without nuclear



# AP1000 – available + suitable



# Impact of using AP1000

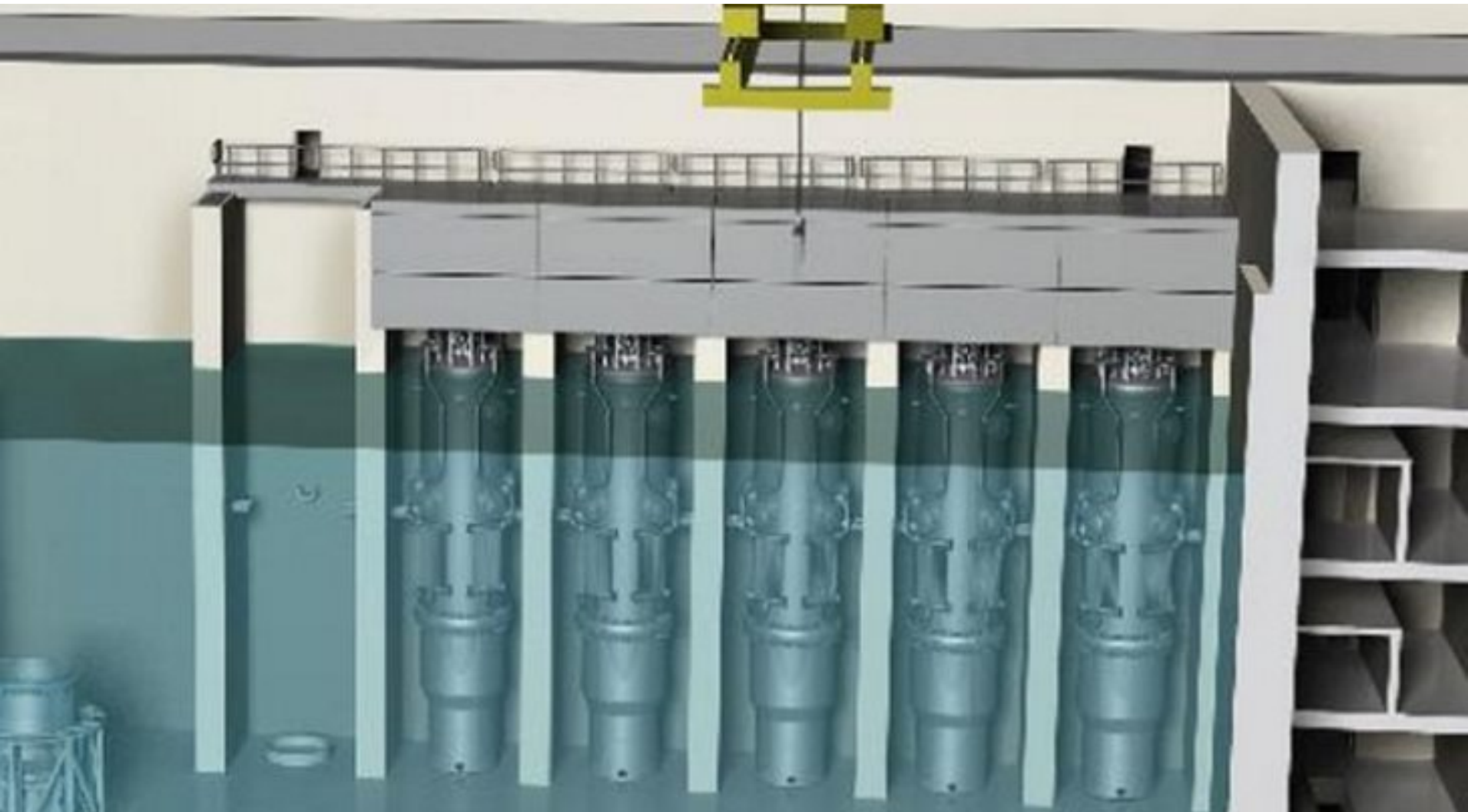
- With a dedicated 600 MW interconnection
- *Preliminary results:*
- Reduces emissions by 38 million tons by 2050
- Costs €7.2 billion extra ( ~ €196/ton CO<sub>2</sub> )



# An even better way with NuScale



# NuScale under water

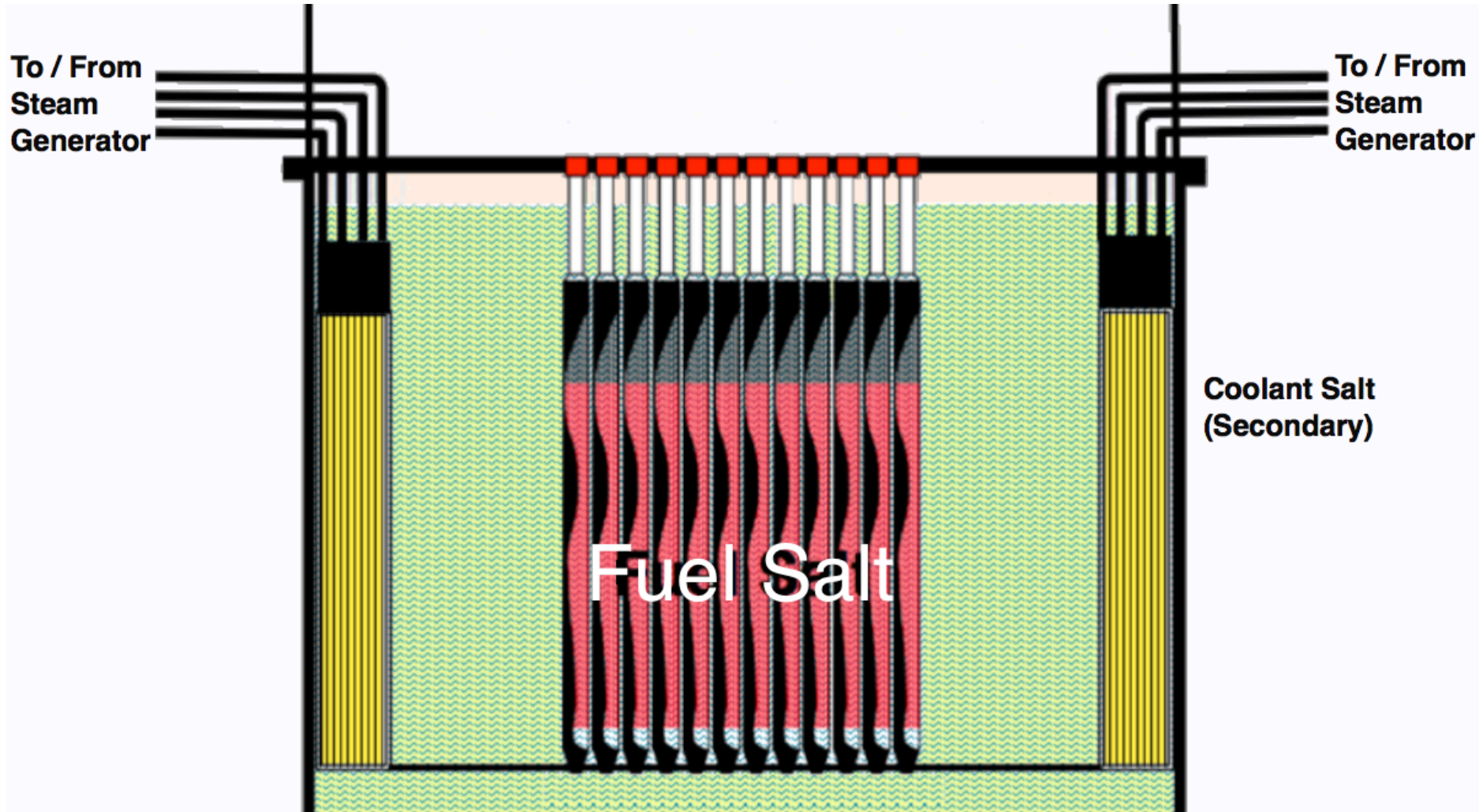


# Impact of using NuScale

- NuScale 360MW available by 2027
- *Preliminary results:*
- Reduces emissions by 42 million tons
- Lowers costs by €3.2 billion (-€32/ton CO<sub>2</sub>)



# Salt-based SMR





# Safety is excellent

- Fuel (salt) already melted – no ‘meltdown’ risk
- Fuel at atmospheric pressure – no explosion risk
- Water / Steam not near fuel – no H<sub>2</sub> explosion risk
- Proliferation resistant
- Can’t explode like an atomic bomb – never could!
- Underground – no perimeter radiation
- Salt plug for simple, safe shutdown

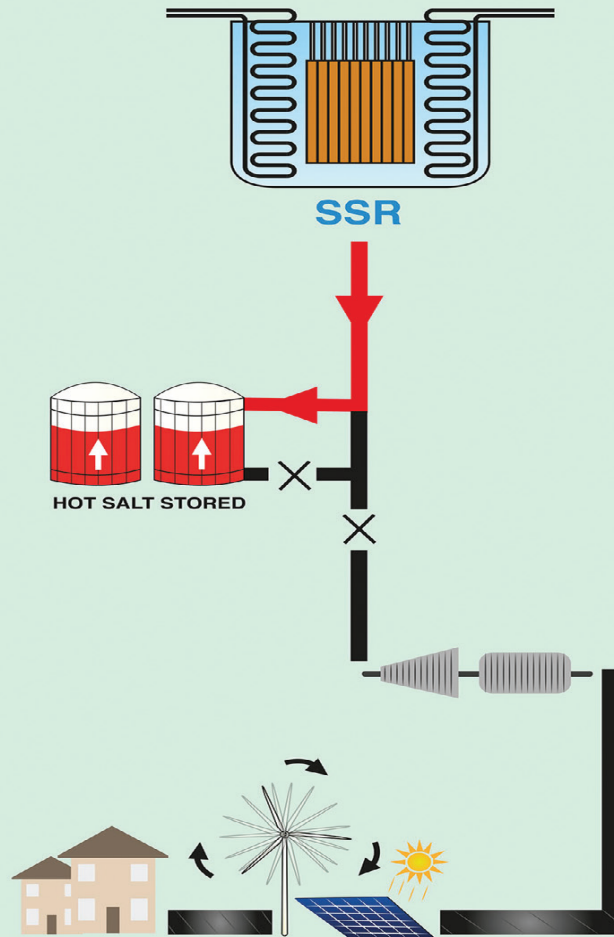
# Waste is even better

- Can use existing 'waste' as fuel
- Waste active < 300 years
- Small quantities, managed

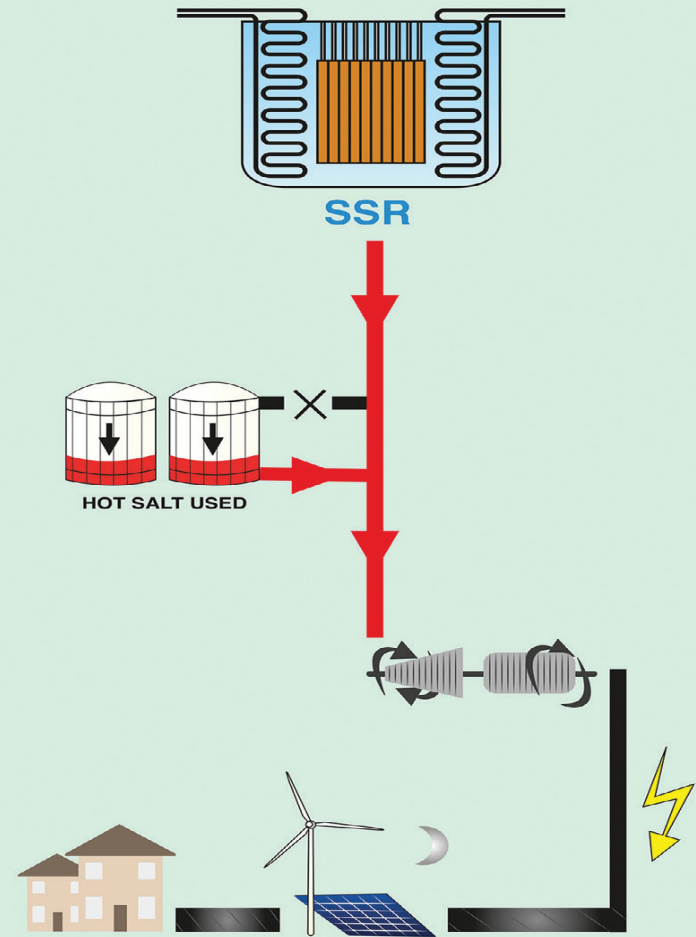
# Salt-based SMR

- Moltex available in 2030 (earlier?)
- *Preliminary results:*
- Reduces emissions by 38 million tons
- Lowers costs by **€20 billion** (-€542/ton CO<sub>2</sub>)

# SMR + thermal salt storage



**RENEWABLES  
'ON'**



**RENEWABLES  
'OFF'**

# Waste - Perception





# Waste - Reality

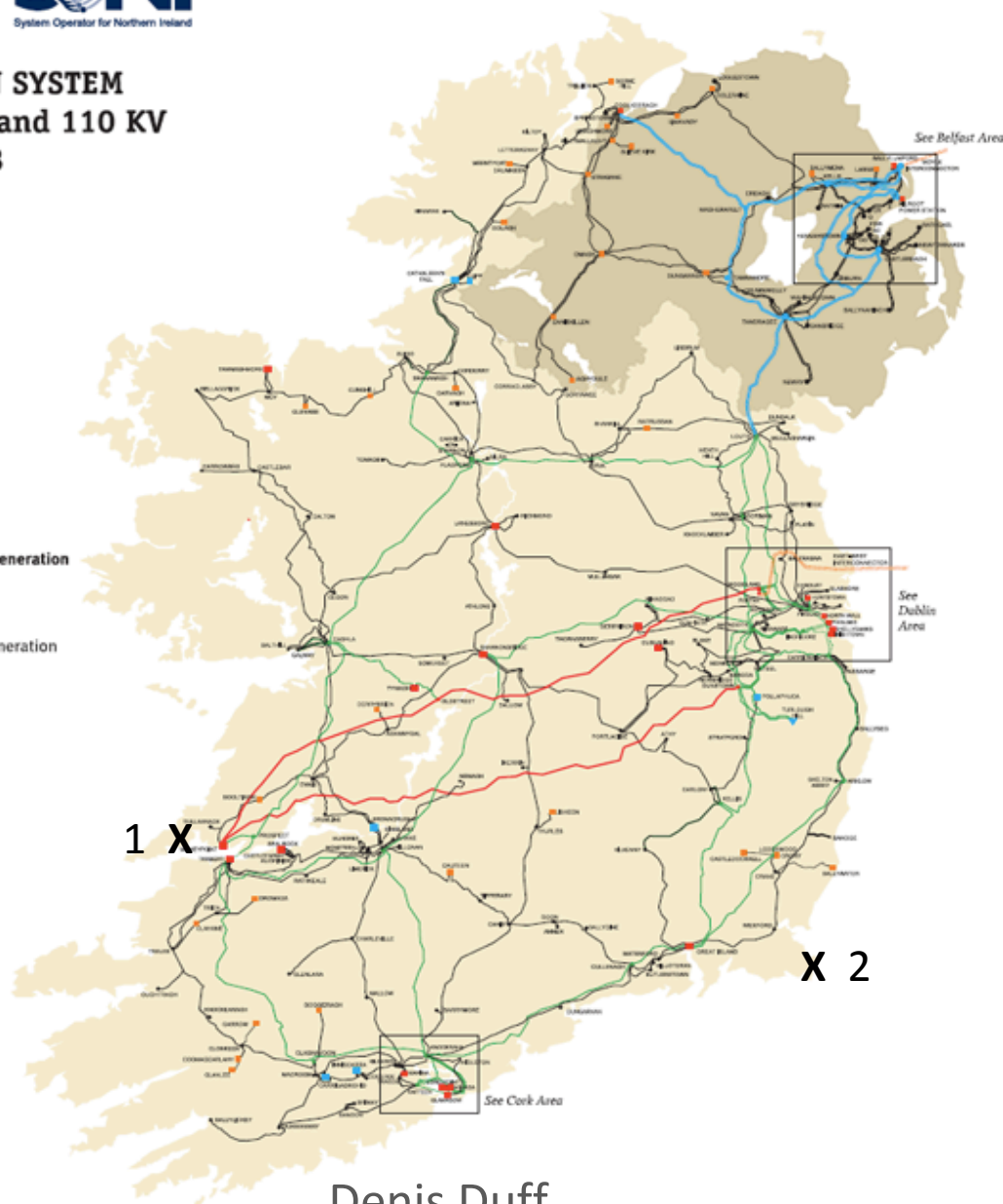
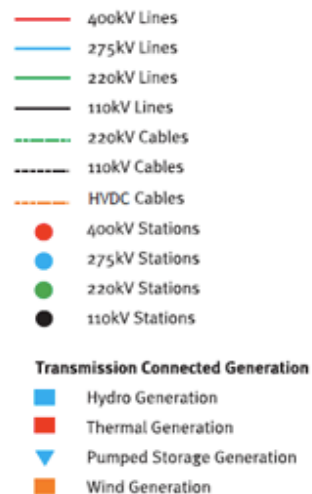


# Waste – Swiss style





## TRANSMISSION SYSTEM 400, 275, 220 and 110 KV JANUARY 2013



# Locations

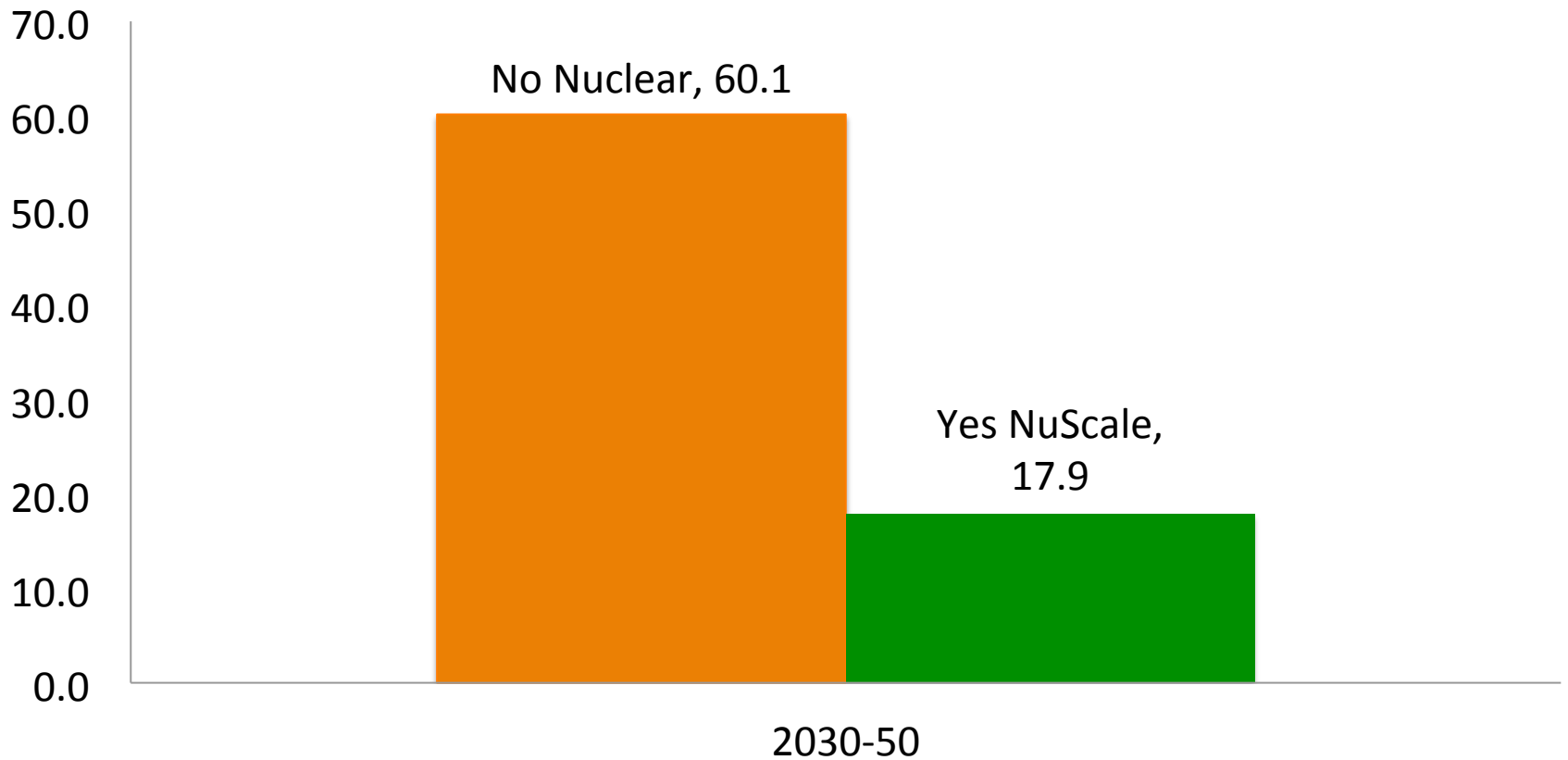
1 Moneypoint

2 Carnsore Point

Other locations

# Emissions reduce dramatically

Million tons CO<sub>2</sub>



# Capital costs acceptable

€ billion

25.0

20.0

15.0

10.0

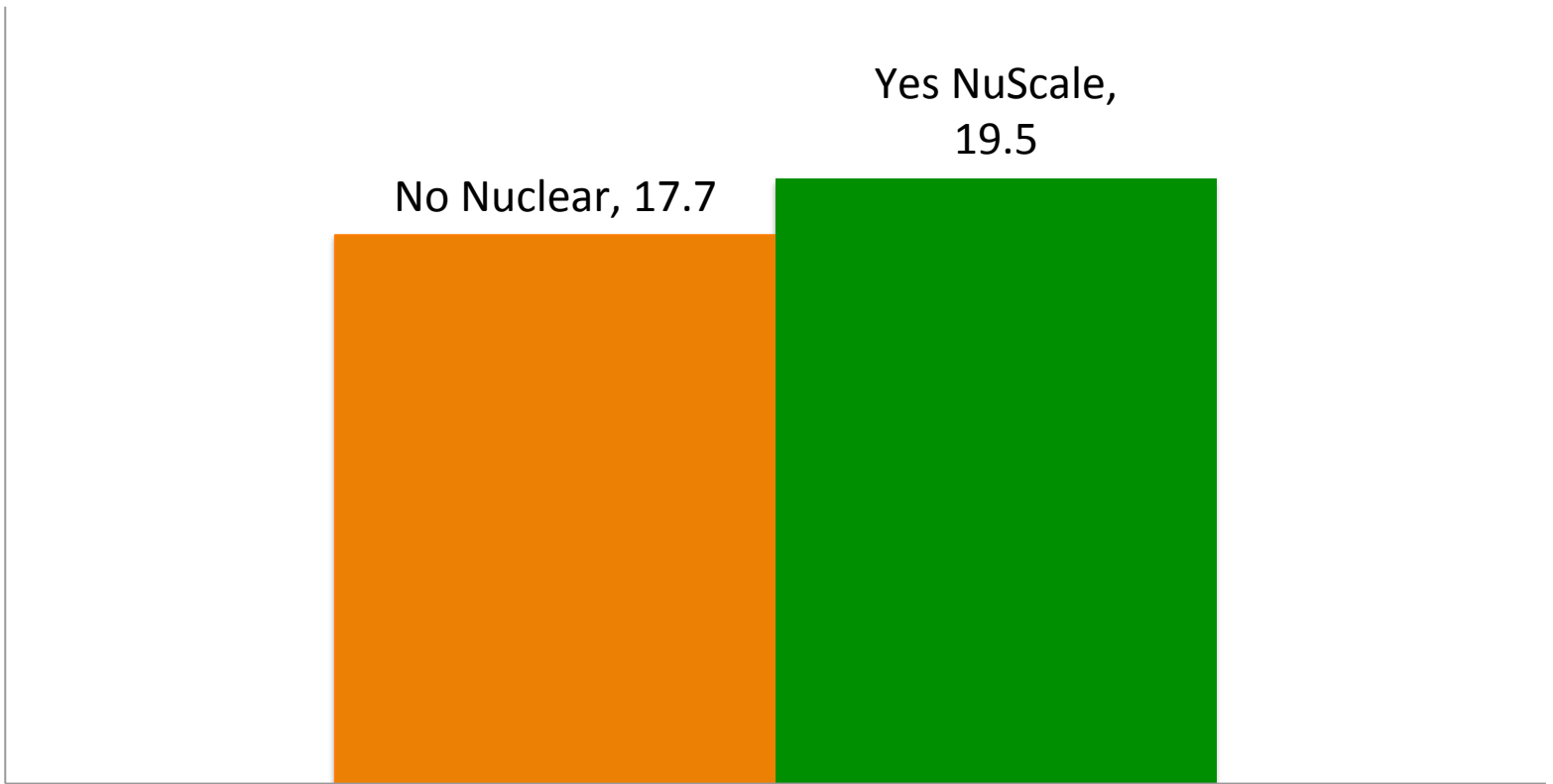
5.0

0.0

No Nuclear, 17.7

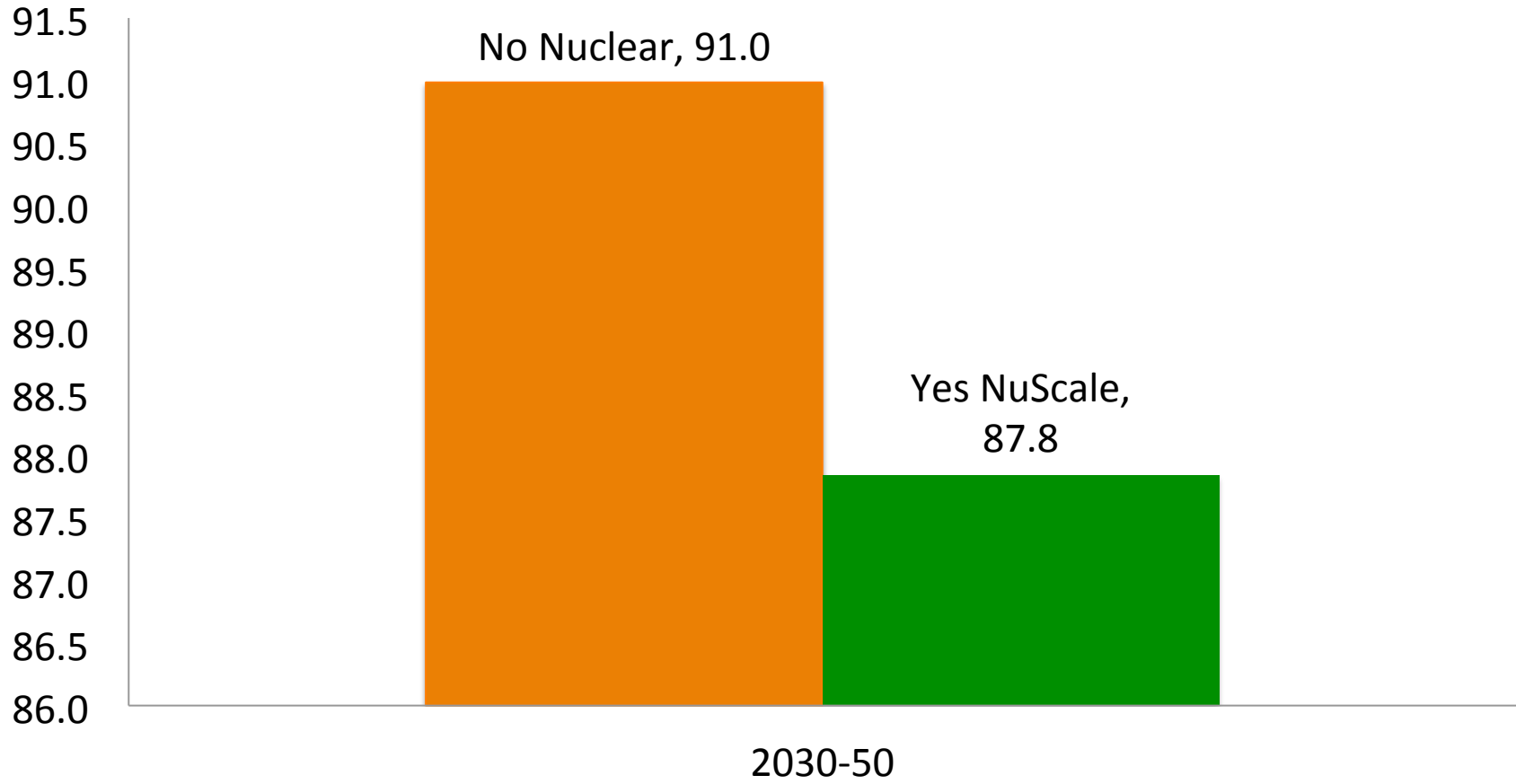
Yes NuScale,  
19.5

2030-50



# Energy costs much lower

€ billion



# Why nuclear for Ireland?

- Nuclear delivers most good with least harm
- Still safest and best way to power civilisation
- Reduces electricity emissions by up to 87%
- Reduces costs by up to €20 billion