

8%????????????2022??406GW??2030????515GW?2050????812GW????OECD???

(NEA)????????????????????2050????????????479GW???IEA

????????????60%???

????????????IEA?NEA????????????????2022????????????Lawrence

Livermore National Laboratory, LLNL????????National Ignition Facility,

NIF????????????2.05MJ????????????3.15

MJ ?????????????300MJ

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????????????2060?2070????IEA????????(Technology Readiness

Levels)??2????????????2050????????????????Eric

[Wesoff](#)????????????????????

????????????(advanced

reactor)????????????50~300MW

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?1. ??????????

	第三代+		第四代		
	大型輕水式反應爐	輕水式小型核能機組	高溫氣化反應爐	溶鹽式反應爐	微型
裝置容量	1GW	70~300	80~270	200~800	1~50

燃料類別	LEU	LEU	HALEU	HALEU	HALEU
冷卻劑	水	水	氣, 氦氣	金屬或鹽	多樣
機組案例	Vogtle 3,4號	NuScale	X-energy	TerraPower	BWXTX

整理自DOE 2023

????????SMR

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????????????????????NuScale?VOYGR????????SMR????????????

NuScale的教訓 – 延遲與昂貴

NuScale?2000????????SMR????????Utah Associated Municipal Power Systems (UAMPS) ?????????????????????????????????6?77MW

????????????????????????????462MW

????????????????????????????????(certification)

????????????????????2016???50MW????????????????77MW????2023?1

????????????????Standard Design Approval (SDA)

Application????????????????????5????NuScale????2029

????????????????NuScale????????????SMR????????????????

2. NuScale????????????

NuScale???????	??????
2008	2015~2016
2010	2018
2018	2026
2020	2029

IEEFA, 2022

SMR??(The Institute for Energy

Economics and Financial

Analysis, IEEFA)??NuScale????????????????NuScale?2020????????????12?60MW

????????????720????????????????61?????2021

????????????462MW????????????53?????2023?1

????????????93?????IEEFA??NuScale?????????2021???

58USD/MWh????89USD/MWh????????40????????????

120USD/MWh????????????????????????????????

??Environment Working Group????????????????Arjun

Makhijani????????????????????????????????M.V.

Ramana????????????????????NuScale??NRC????????????????NuScale

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??NRC????????????????Vesna

Dimitrijevic????????????????????NuScale

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??(Ed

Lyman) ???NuScale

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??NuScale??????????

????????????????NuScale????????????????UAMPS????NuScale??2024

??????????subscription

level????????????80%????????UAMPS????????25%????NuScale

????????????????????????????NuScale????????????????????

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NuScale????????????SMR????????????????????????????????

????????????Allison

M. Macfarlane ??????????????????????????(PNAS)????????????????????????(Nuclear waste from
small modular reactors

)????????????????????????????????????2?30????????????????????????-129??-79

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????????????SMR????????????SMR????????????????????????????????10????????????EPZ??????

SMR????????????EPZ????SMR????????????????????????EPZ????SMR

Generation

mPower????????EPZ????????1000????????????????????????SMR????????????????????

?SMR????????NRC???53????????????????????????????????Part 53 – Risk Informed, Technology-
Inclusive Regulatory Framework for Advanced

Reactors

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SMR????????

SMR

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????????????(IPCC)

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??2022

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????????????????????????9000????5000????????????3000

????????????????????????????????????3600????????????NuScale

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??AkademikerPension?????[??](#)

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??CCS????????????

?????????? CCS ??????????????????IEA

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???????????????????? 2050 ?????????????????60%?????5%

????????????????????10%???????? 2040 ???????????

????SMR????????????????????????????2050

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