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???????IEA?????????????????????????????????IEA

??????????????????????????????????????2030????? 61%?? 2050 ????

88%?2050 ????????????????????? 10%??

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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

????????????????????????????????

???????????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

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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	BWTX

整理自DOE 2023

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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

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??????????????????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???????????????????

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

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level??????????????80%???????UAMPS???????????25%?????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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??53???????????SMR

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SMR????????

SMR

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

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

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

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

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

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

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

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

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