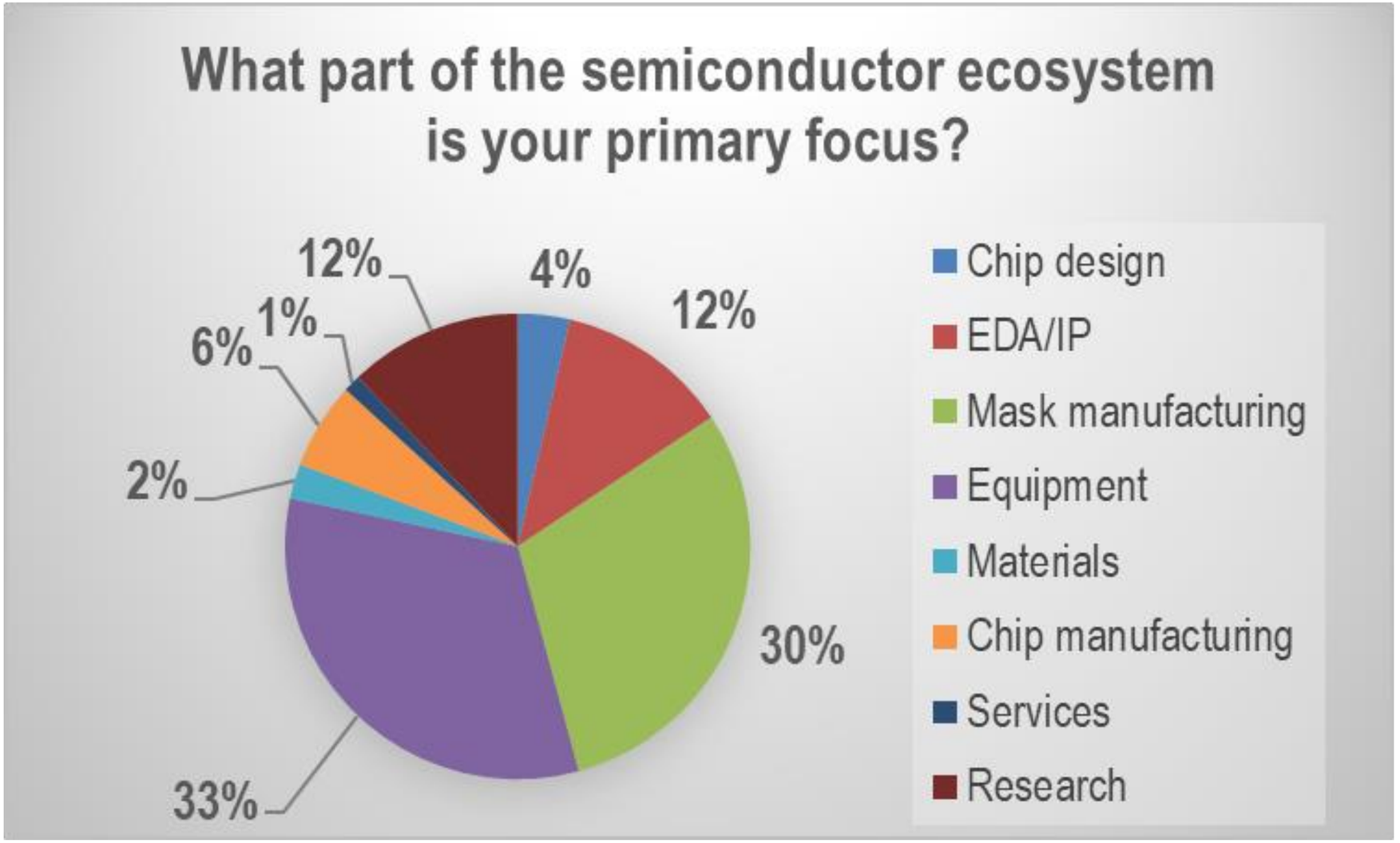
Thank you to those who participated in the survey!

Luminaries survey results available on www.ebeam.org

NOTE: this PDF was updated in July 2025 to correct plots on page 18

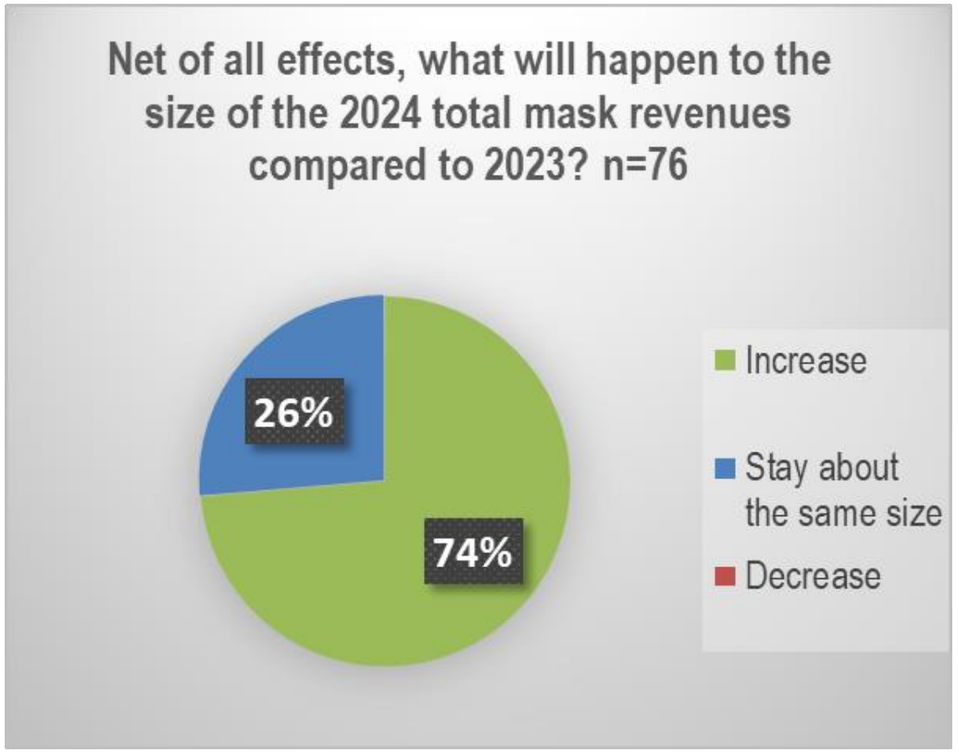
84 Luminaries Participated in the 13th Annual Survey

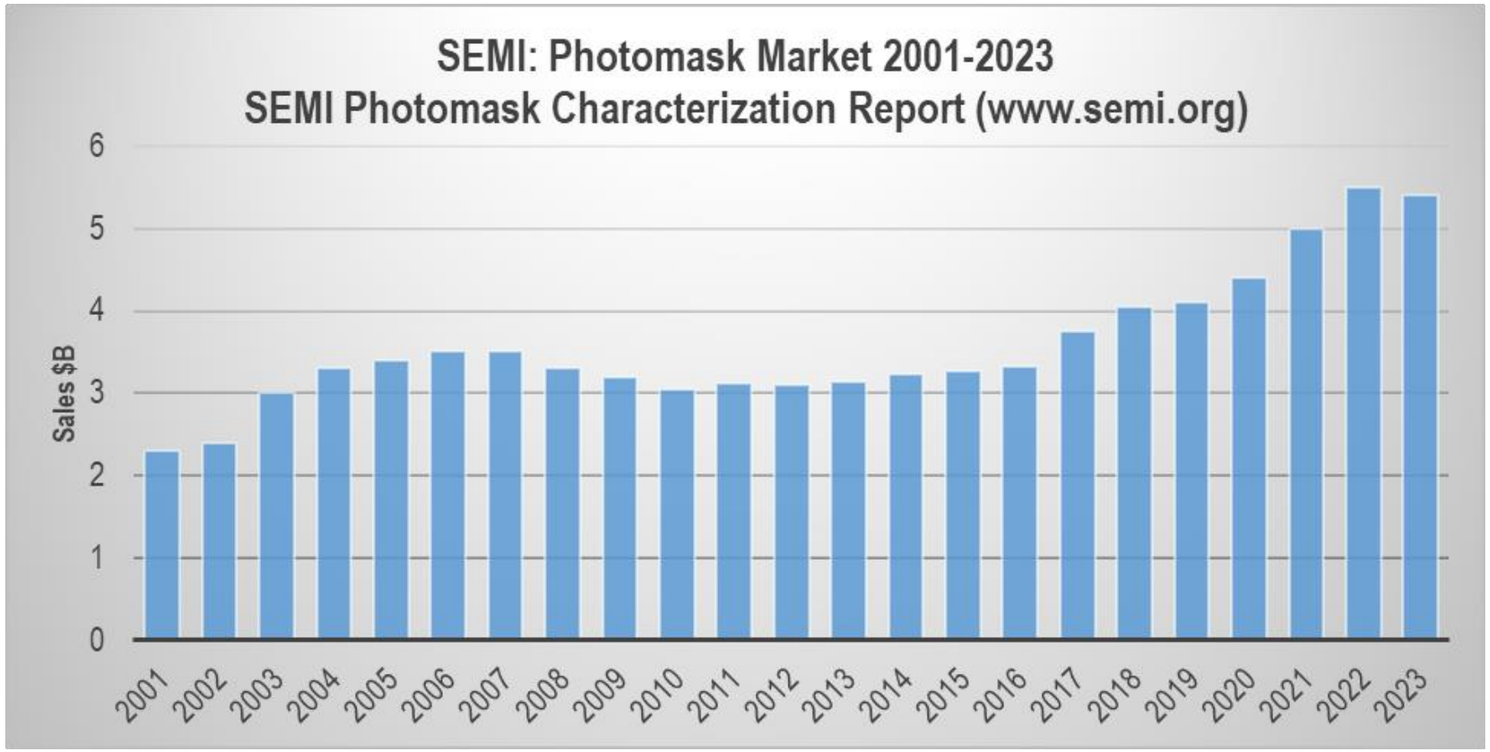
Representing 49 different companies in July 2024



74% Say 2024 Mask Revenues Will Increase Over 2023

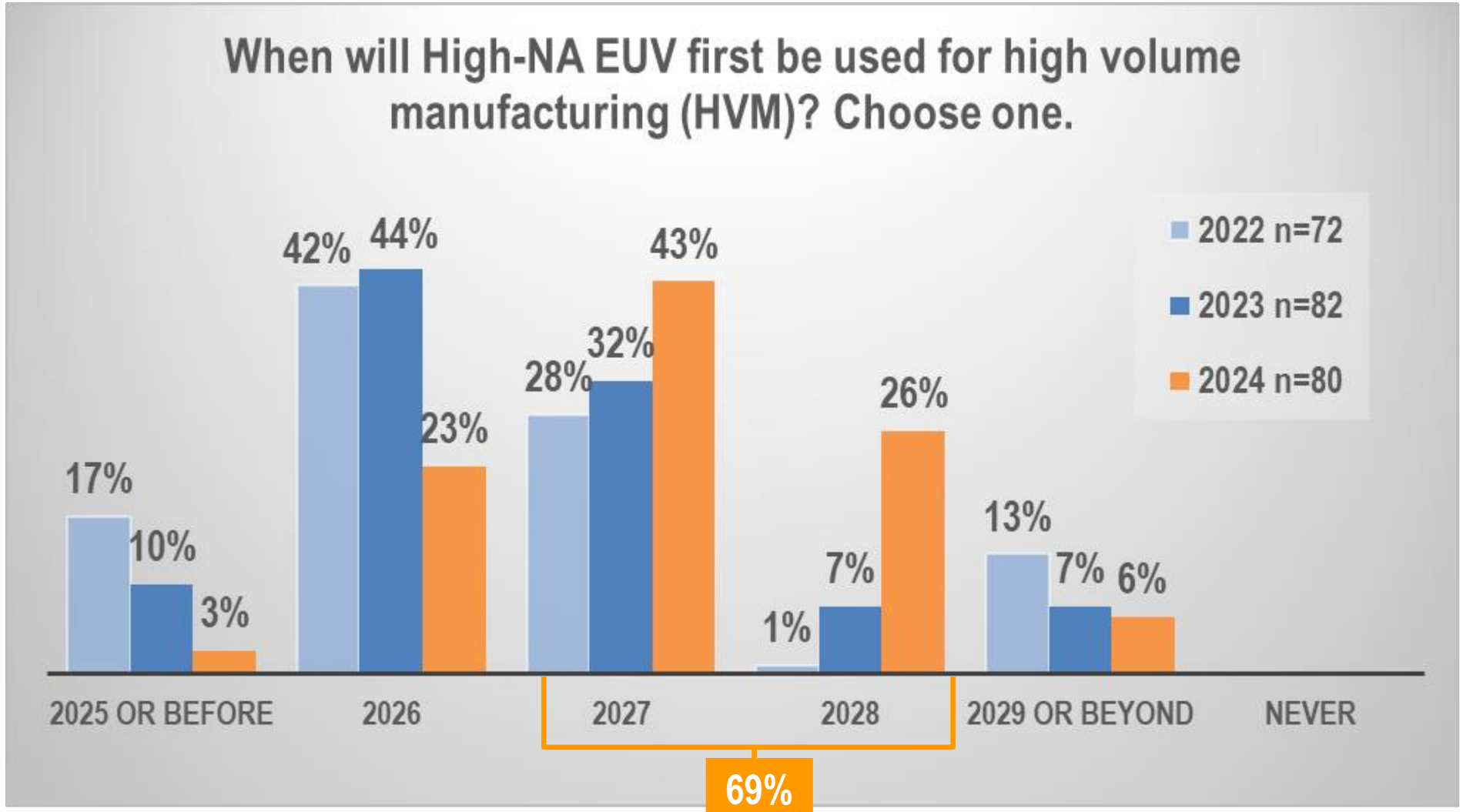
SEMI reported $5.4B for 2023 – 7.2% CAGR since 2016!





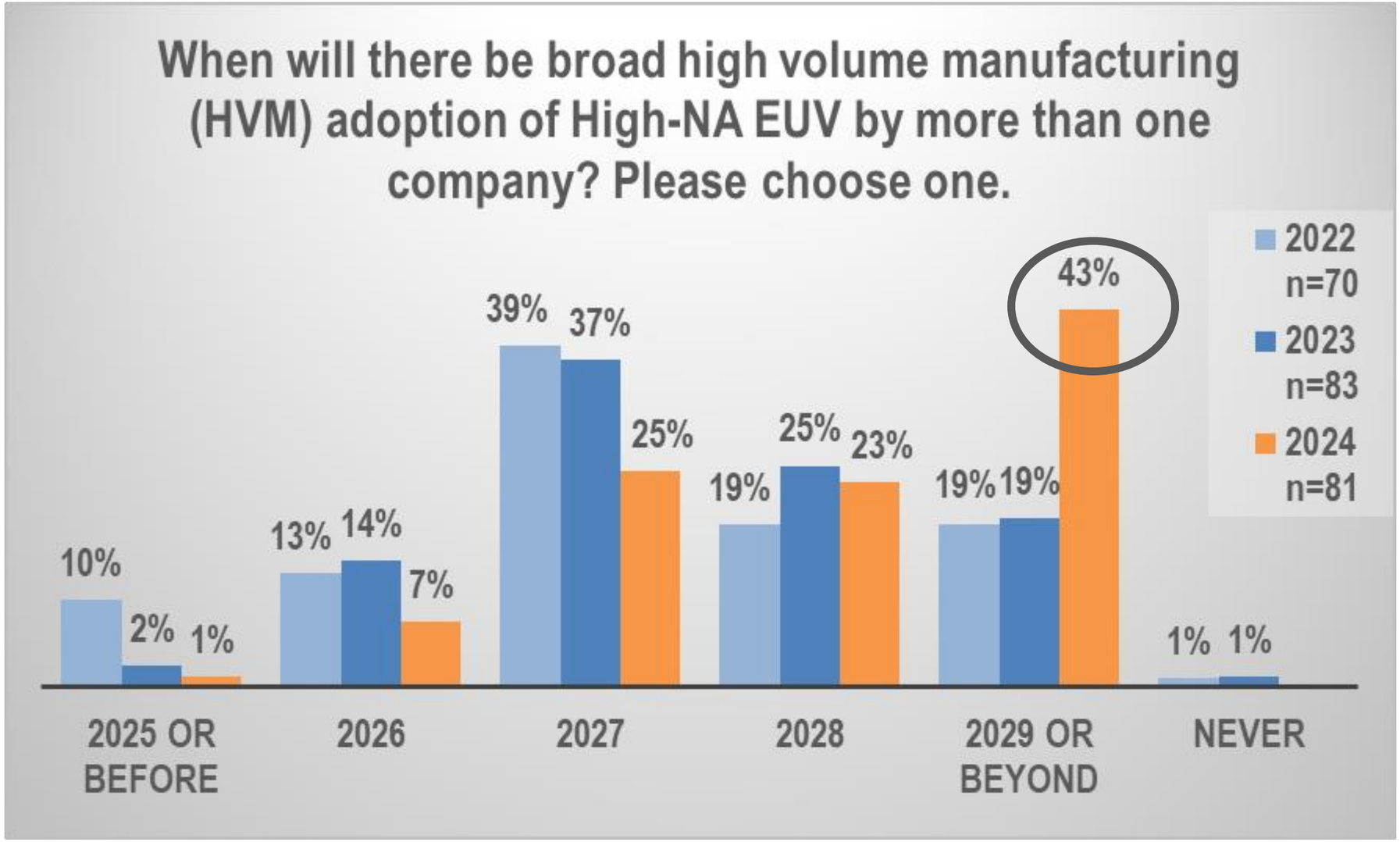
Opinion for High-NA EUV First HVM Usage is Clearer

69% of Luminaries say 2027 or 2028



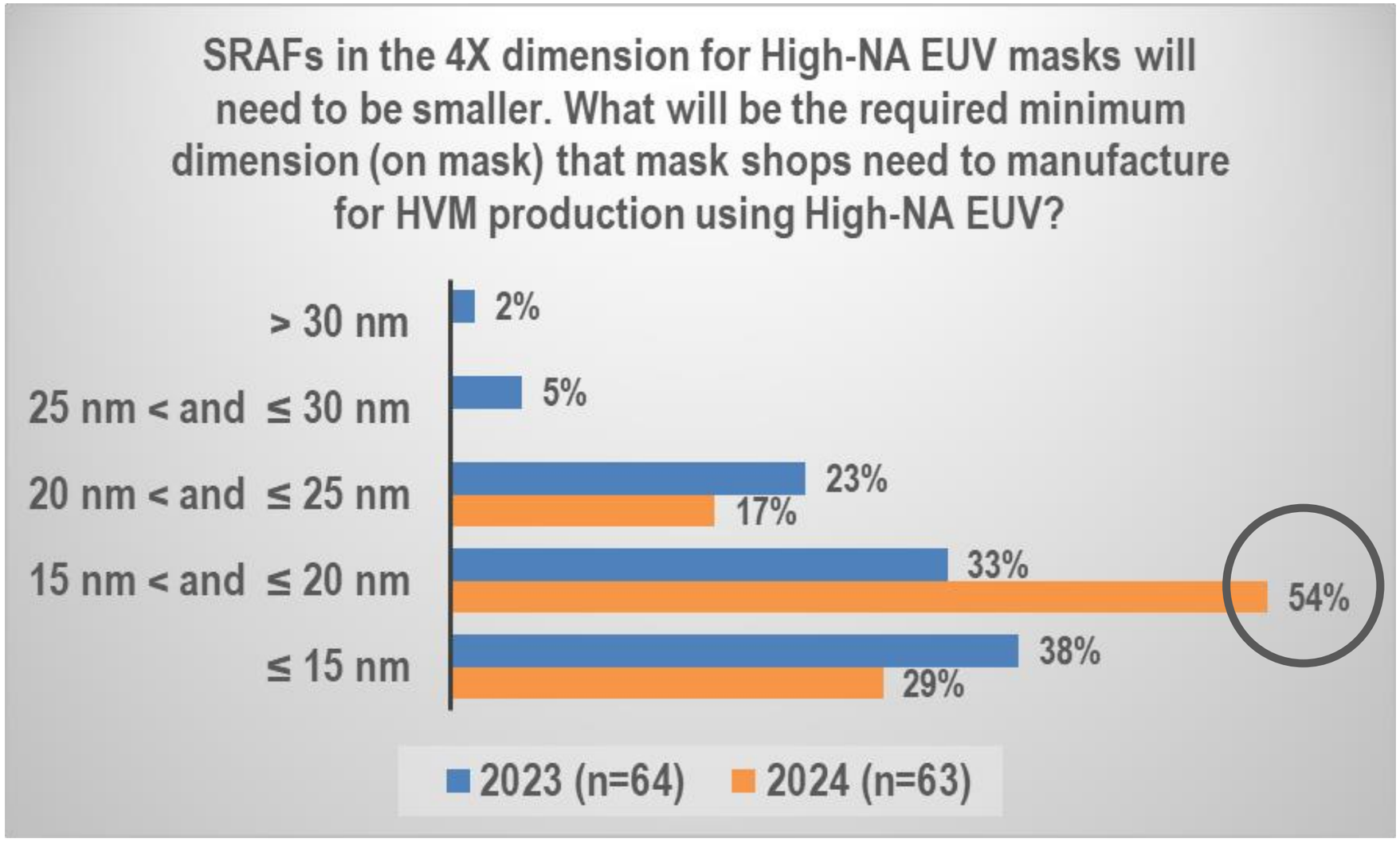
Estimates of High-NA EUV Broad Usage Shift to 2029 or Beyond

19% said that in 2023 and 43% in 2024, but no one says “never”



54% Say Min Mask Dimension High-NA EUV >15nm and ≤20nm

33% said that in 2023

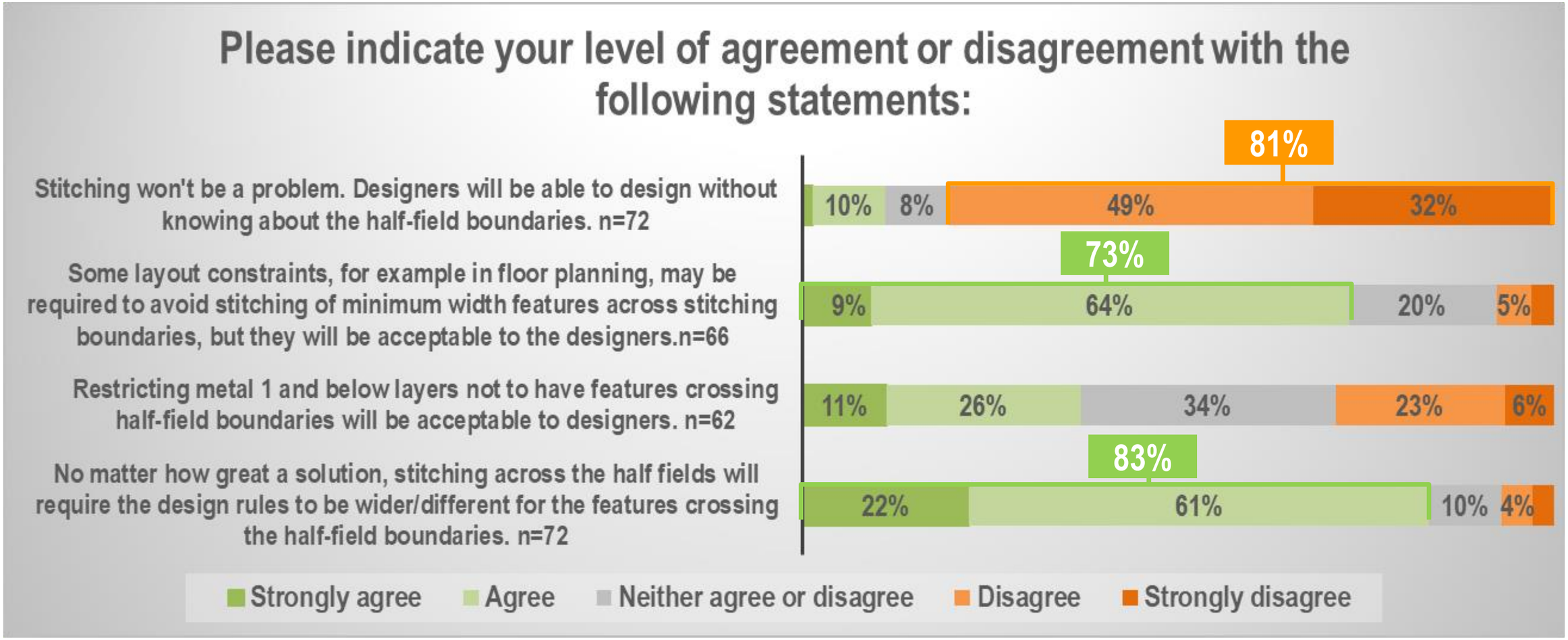


New Questions on Stitching for High-NA EUV Masks

81% Disagree with “stitching won’t be a problem”

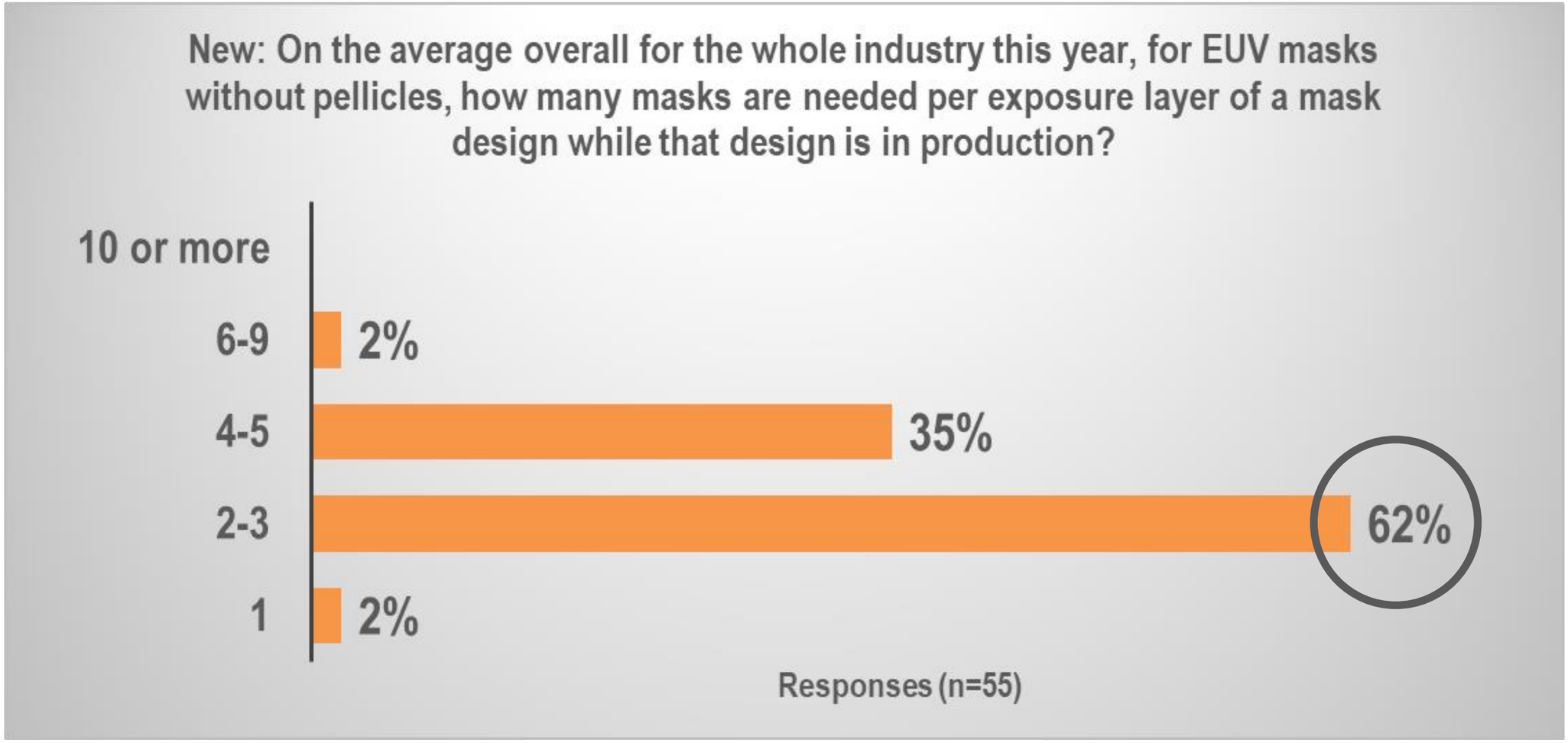
73% Agree some layout constraints acceptable to designers to avoid stitching

83% Agree stitching portion requires different design rules



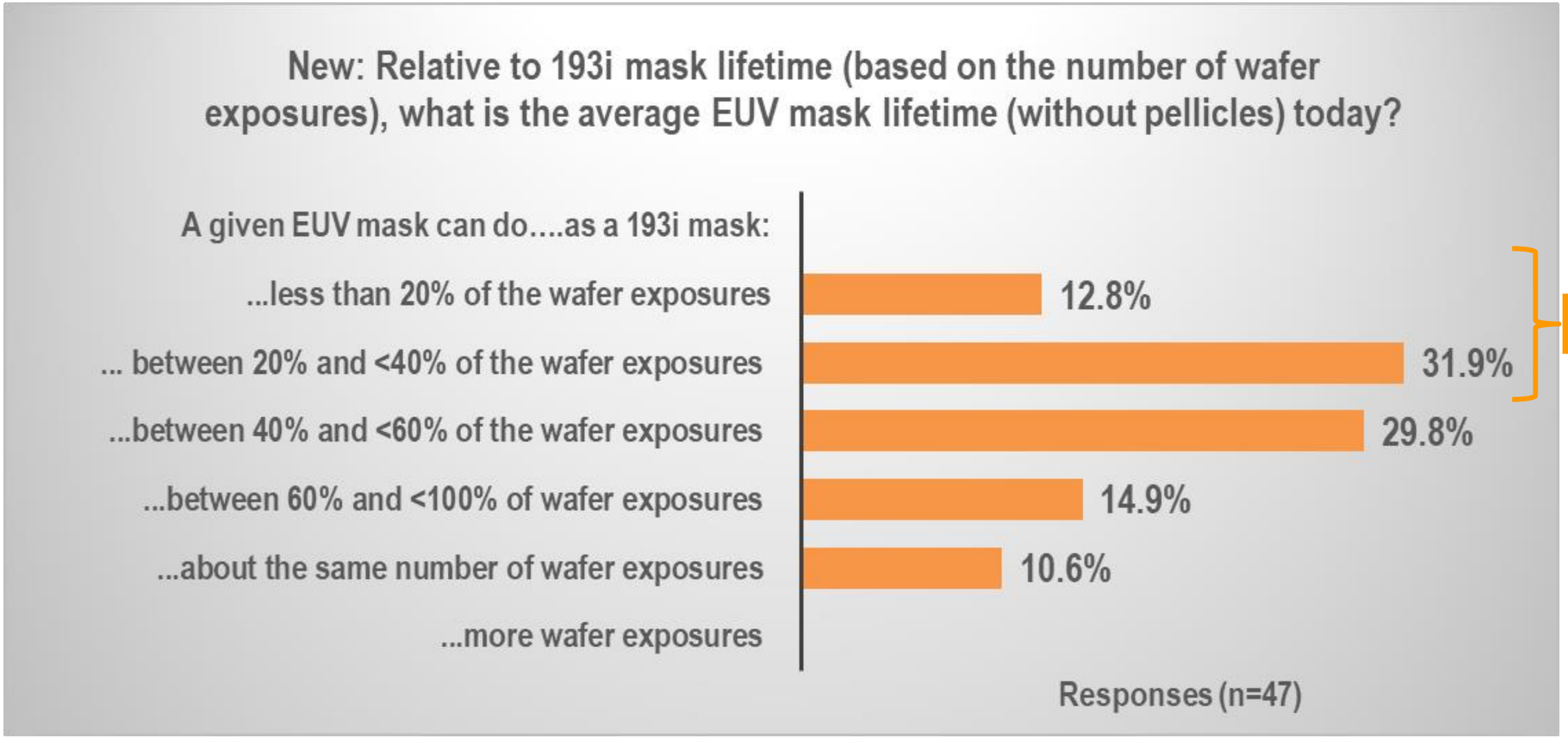
62% Say 2-3 EUV Masks Per Layer Needed if No Pellicles

While design is in production (question reworded from 2023)



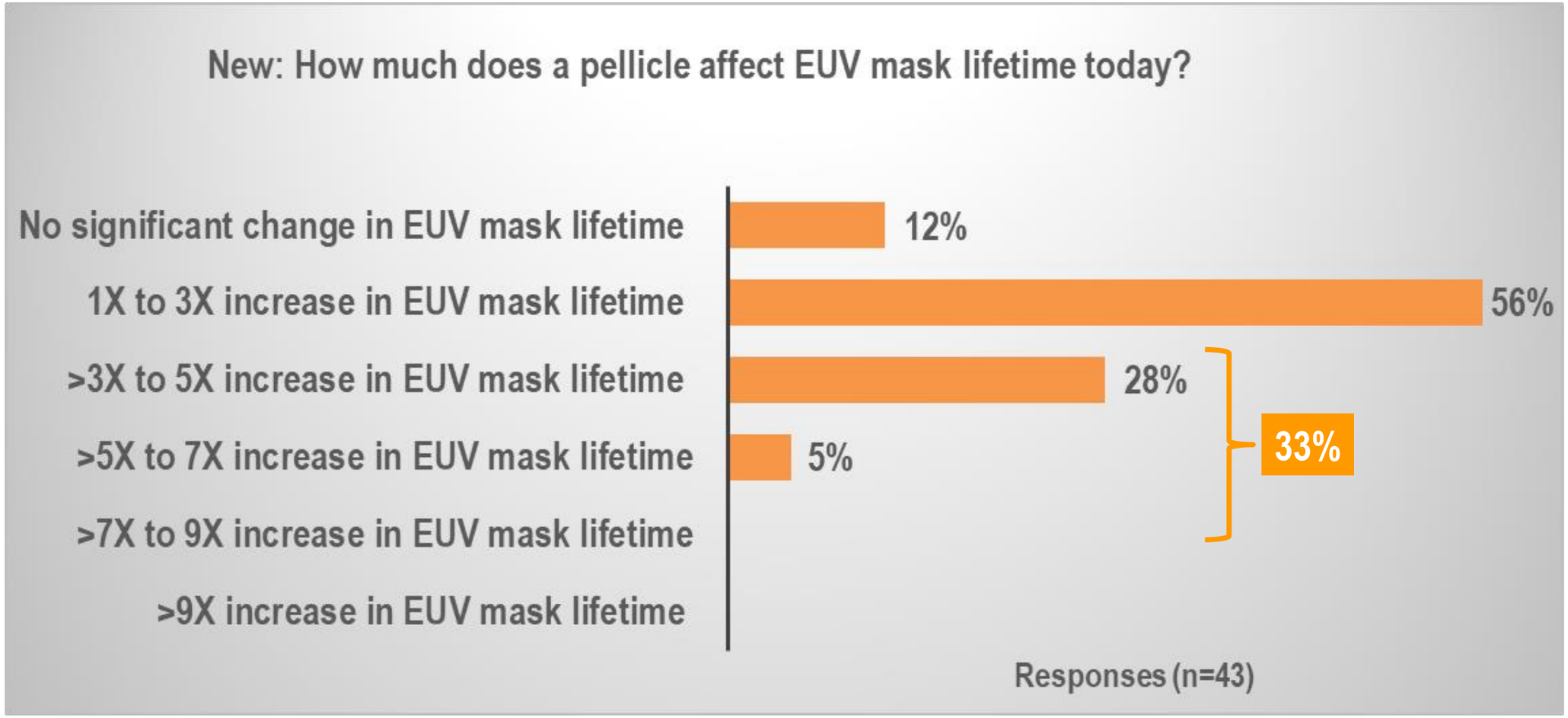
45% Say EUV Masks w/o Pellicles Have <40% Lifetime of 193i

New question (n=47) asks about pellicle impact on lifetime



33% Say Pellicles Increase EUV Mask Lifetime at least 3X

New question in 2024 (n=43)

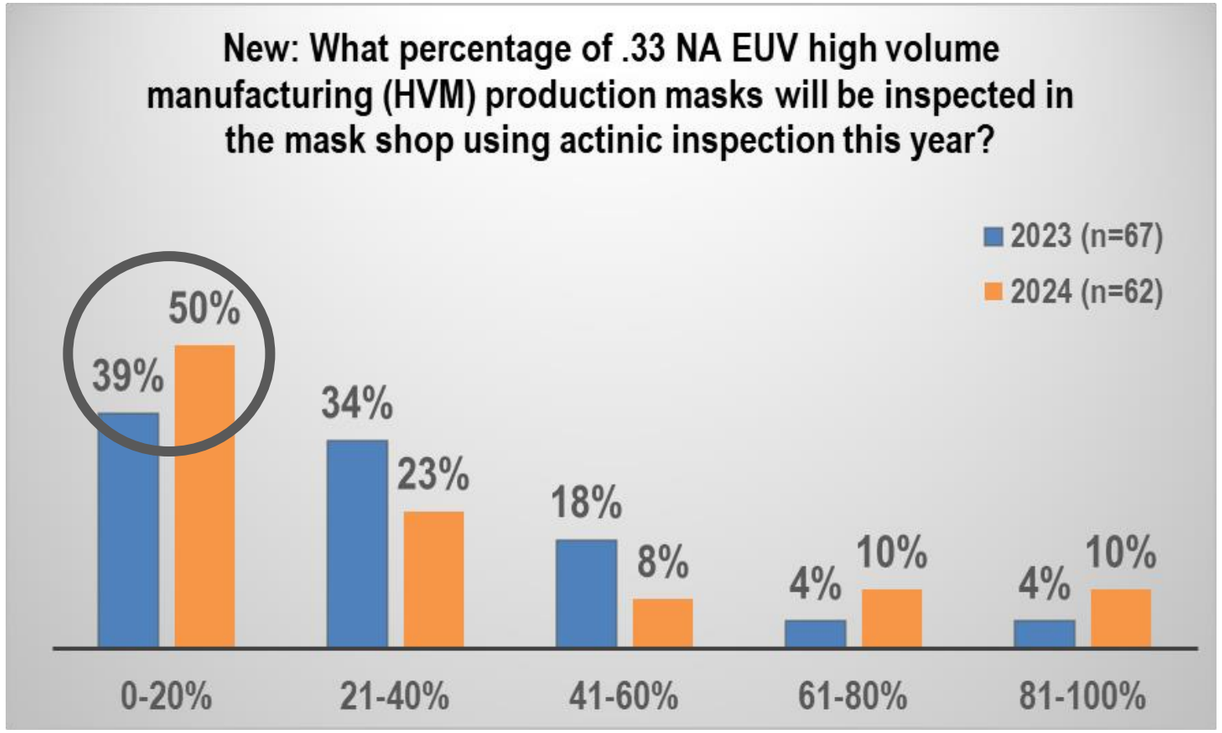


Opinions on Actinic EUV Mask Inspection Clear for Today

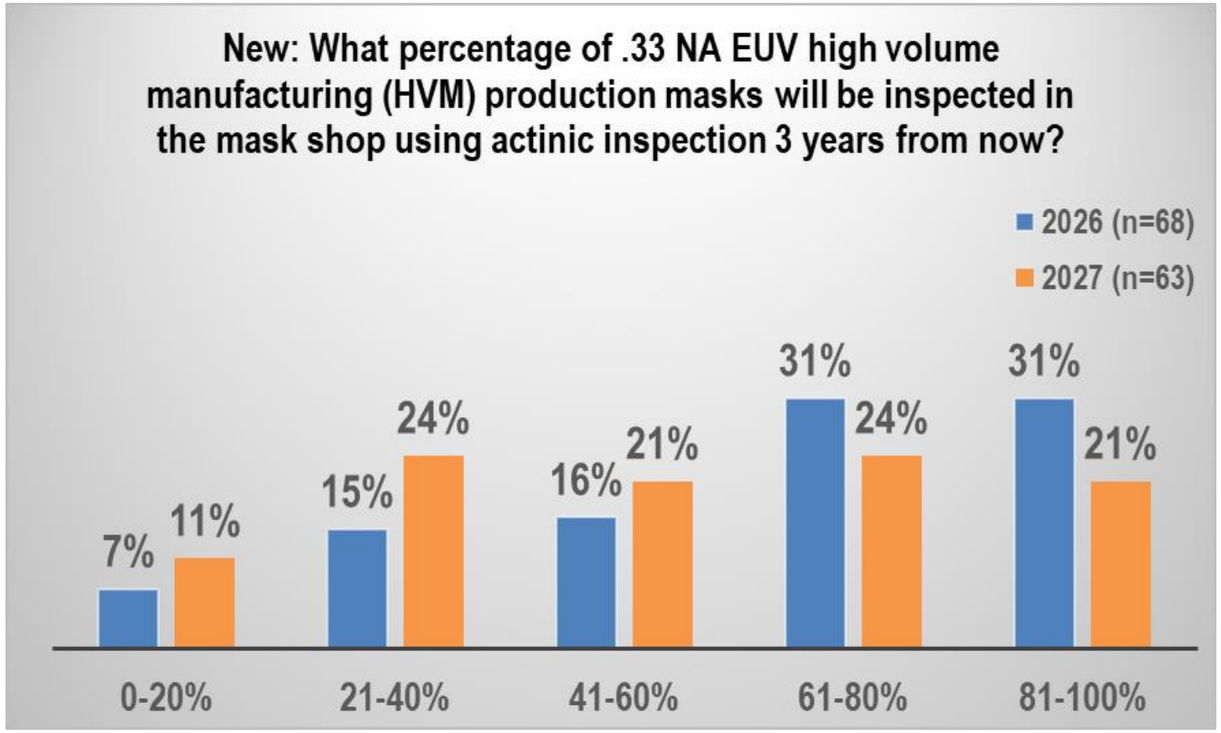
50% say ≤ 20% of HVM masks vs 39% last year; no clear trend in 3 years

eBeam Initiative

Predictions for Today

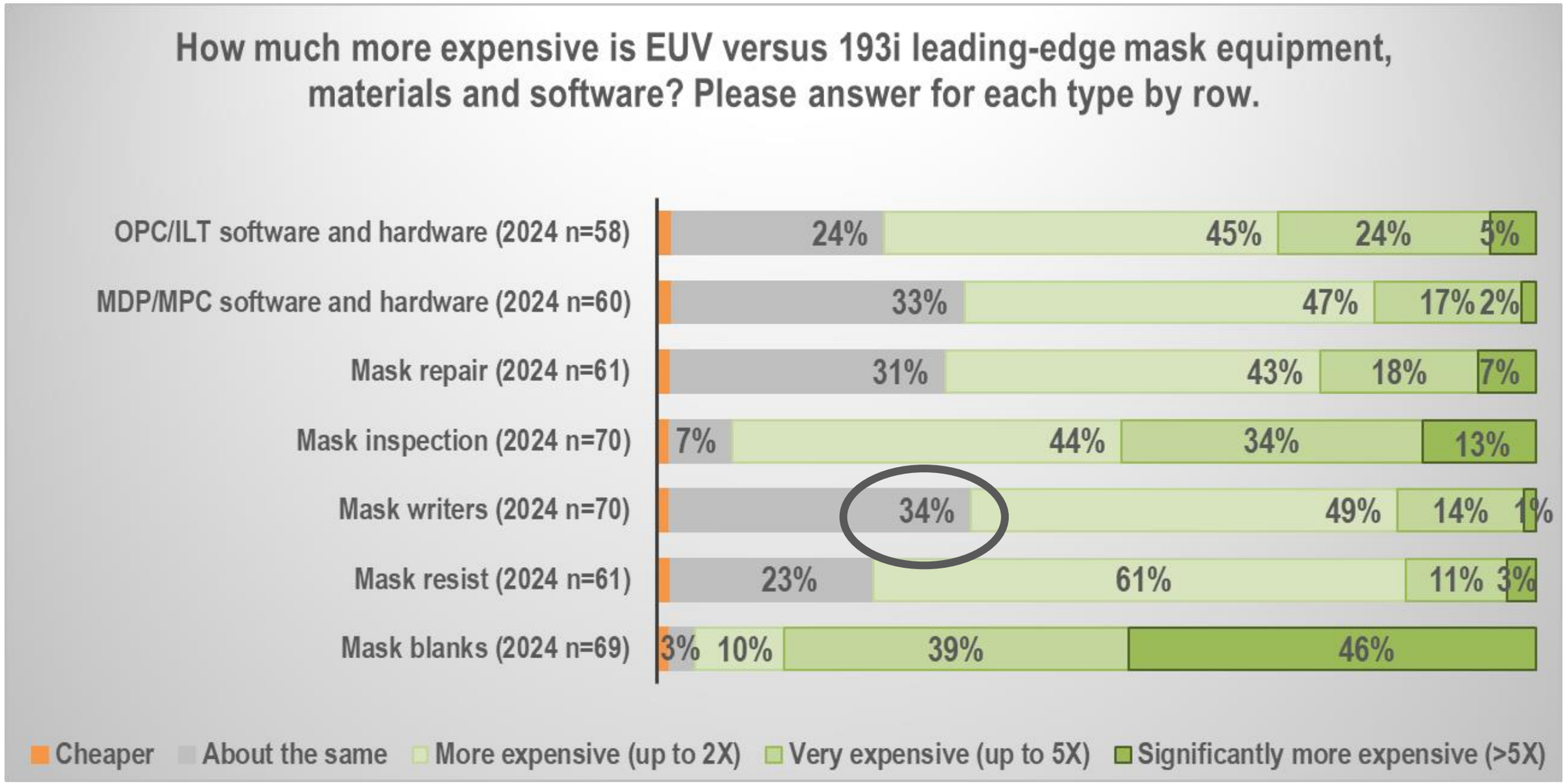


Predictions in 3 Years



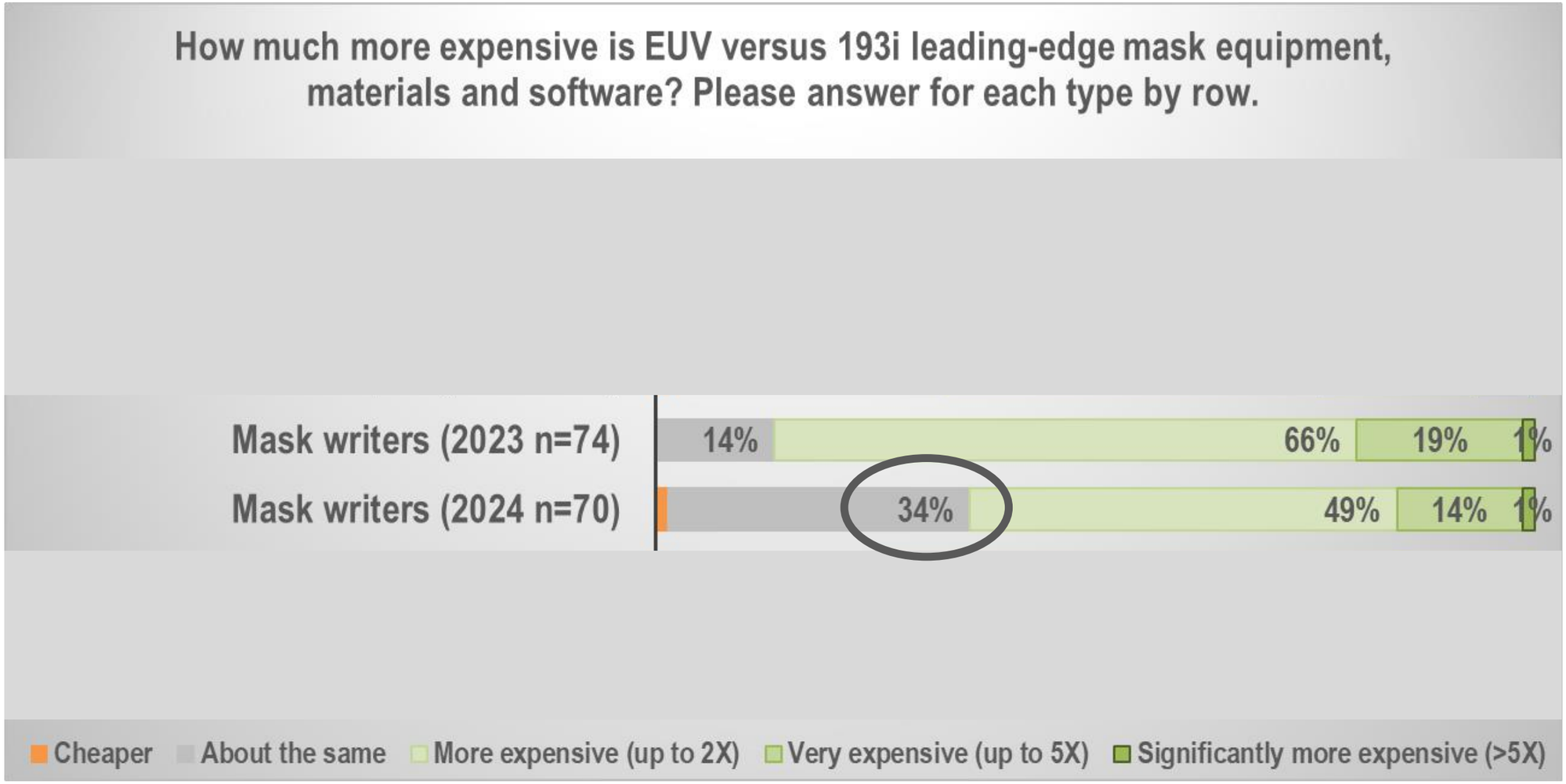
Overall Trend for EUV > 193i Mask Costs Unchanged

Opinion that mask writers are about the same cost increased to 34% from 14%



Overall Trend for EUV > 193i Mask Costs Unchanged

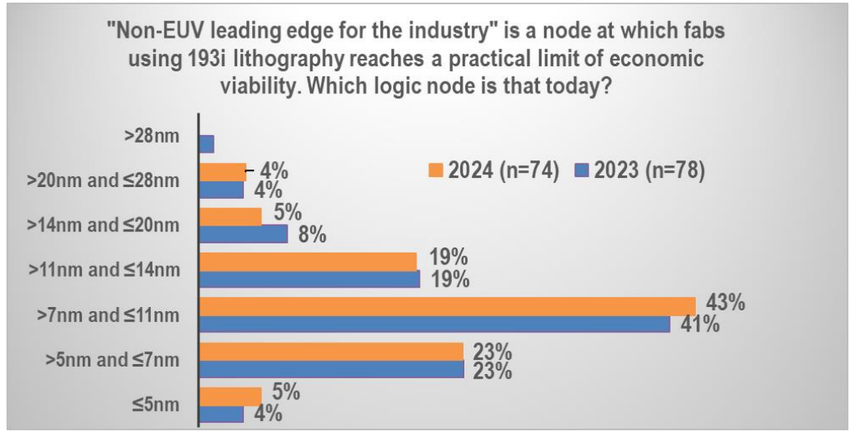
Opinion that mask writers are about the same cost increased to 34% from 14%



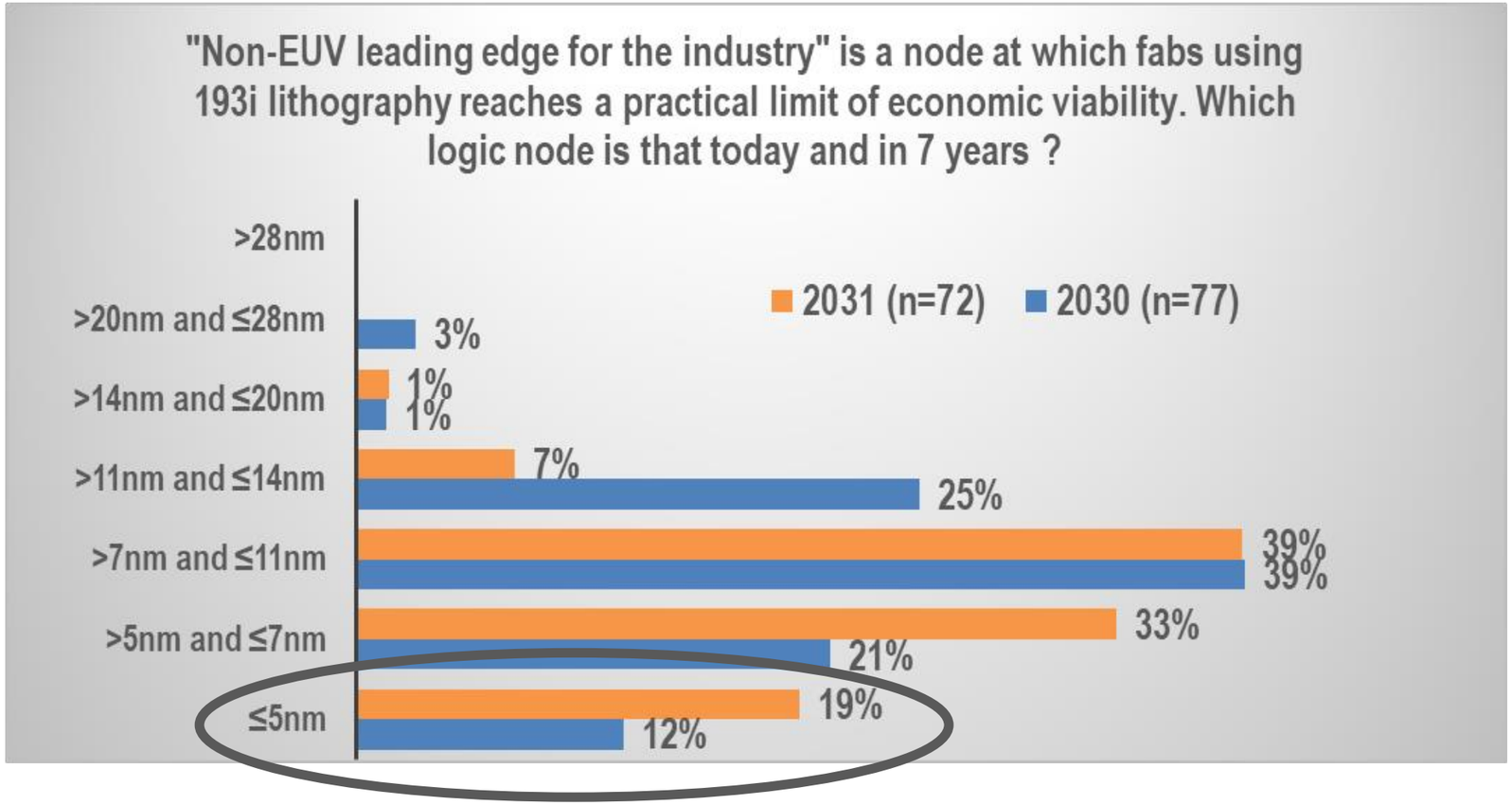
Confidence Increased: Fabs w/o EUV Can Reach ≤ 5nm in 7 Years

19% say ≤ 5nm vs 12% who said that last year

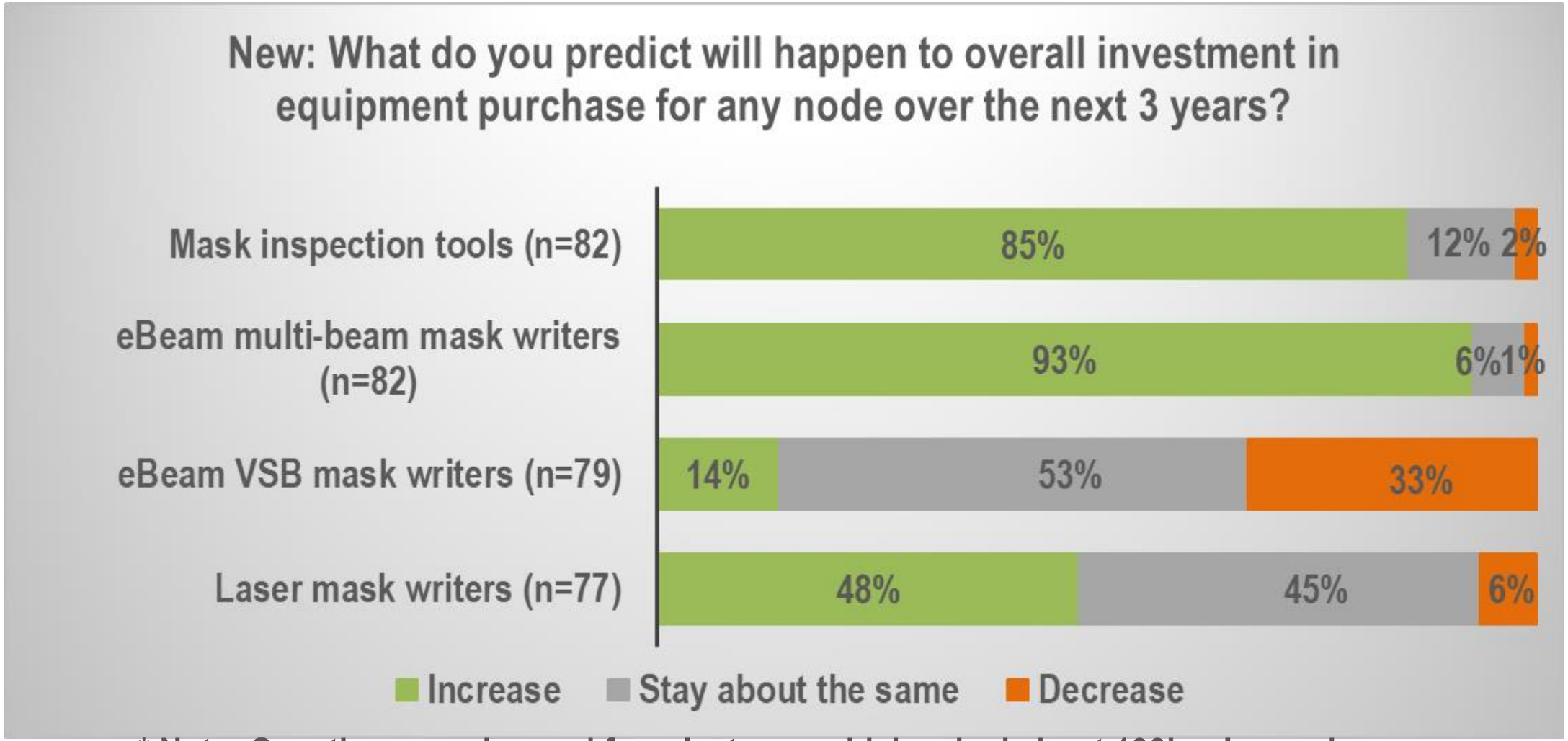
“Today”



“In 7 Years”



Mask Inspection, Multi-beam and Laser Mask Writers: Positive Outlook for Purchasing New Equipment for Any Node*

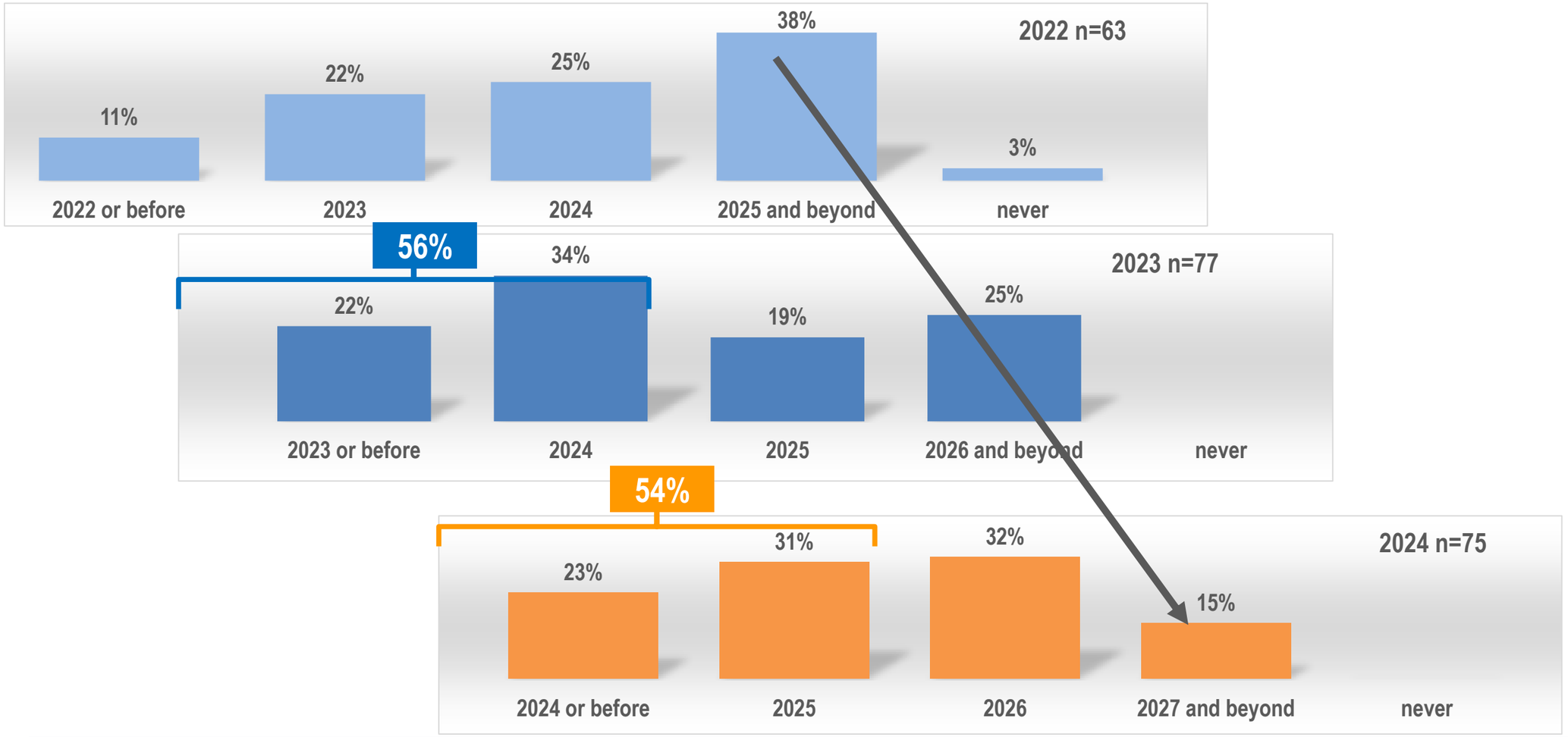


* Note: Question was changed from last year which asked about 193i only purchases

Predictions of Deep Learning Adoption Slip A Year

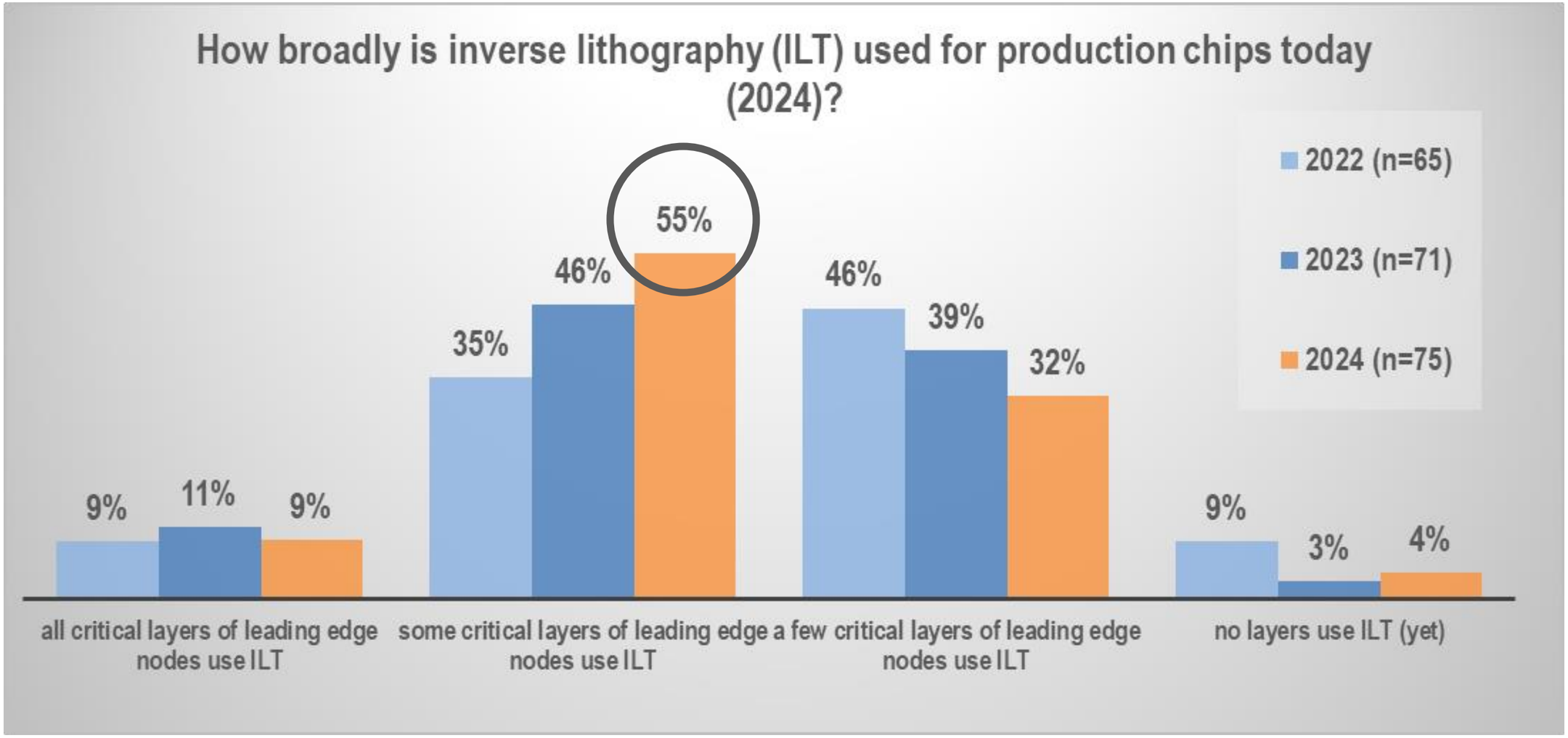
However, “three years from now” trend has decreased from 38% to 15%

In the mask industry, when will capabilities based on deep learning become a competitive advantage for any step in the mask making process?



Survey Results Point to More Critical Layers Using ILT

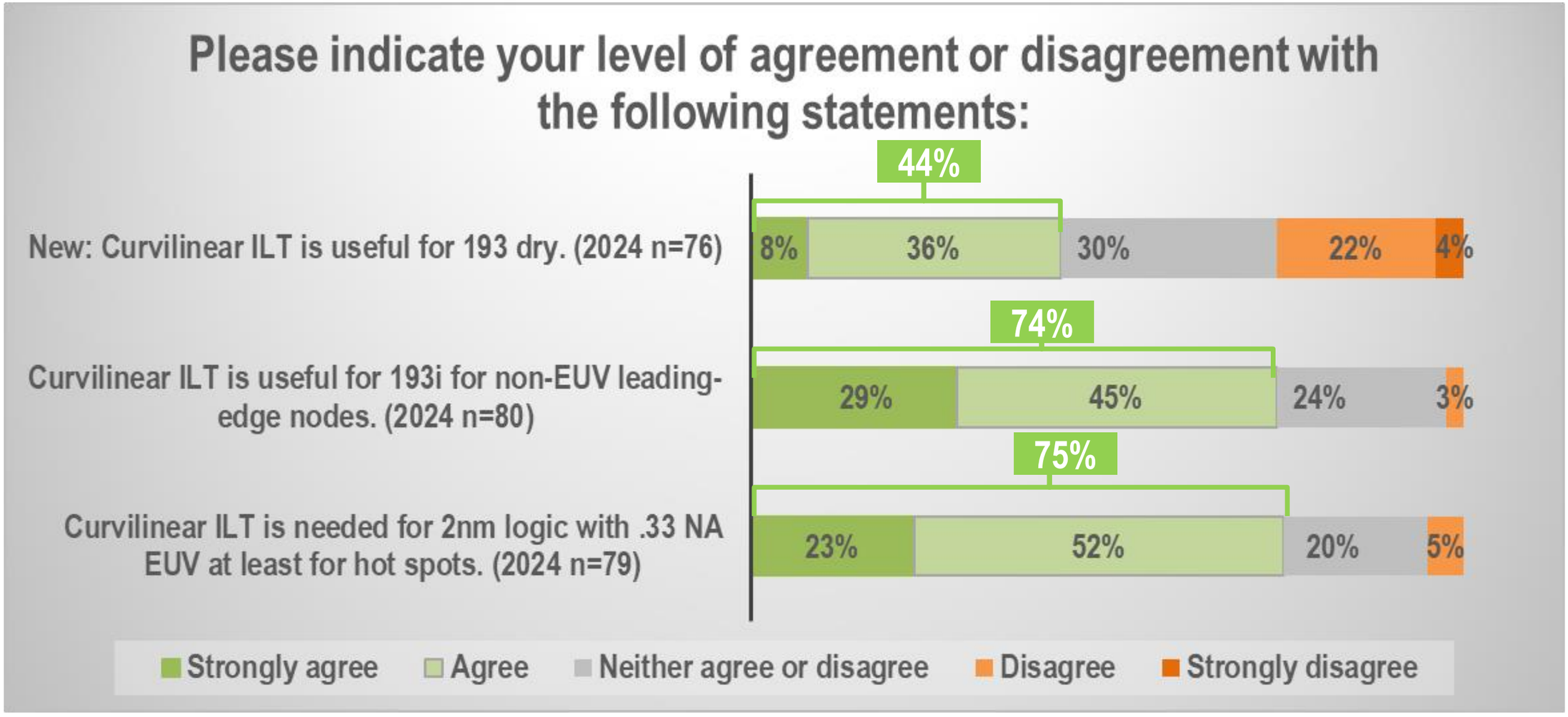
55% say “some critical layers” in 2024 vs 46% in 2023



Note: Repeat question since 2017 but only showing most recent 3 years in this chart

New Question: 44% Agree Curvilinear ILT Useful for 193 Dry

74% “agree” useful for 193i, “strongly agree” up 5% to 29%; EUV is similar to 2023



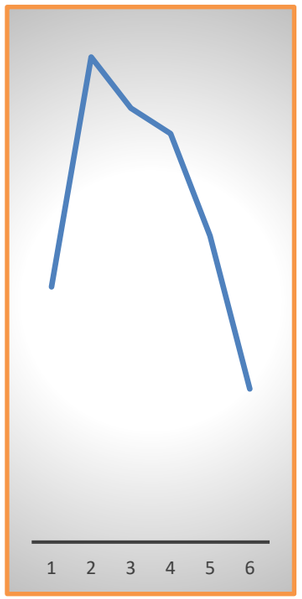
Mask Shop Software Infrastructure Top Curvilinear Concern

Please rank your biggest concerns in producing masks with curvilinear* shapes. n≥73

#1: Mask shop software infrastructure

N/A=10%

#2: Mask Inspection



N/A=10%

#3: ILT software

N/A=13%

#4: Mask Metrology

N/A=10%

#5: Access to Multi-beam Mask Writers

N/A=13%

#6: Mask Repair

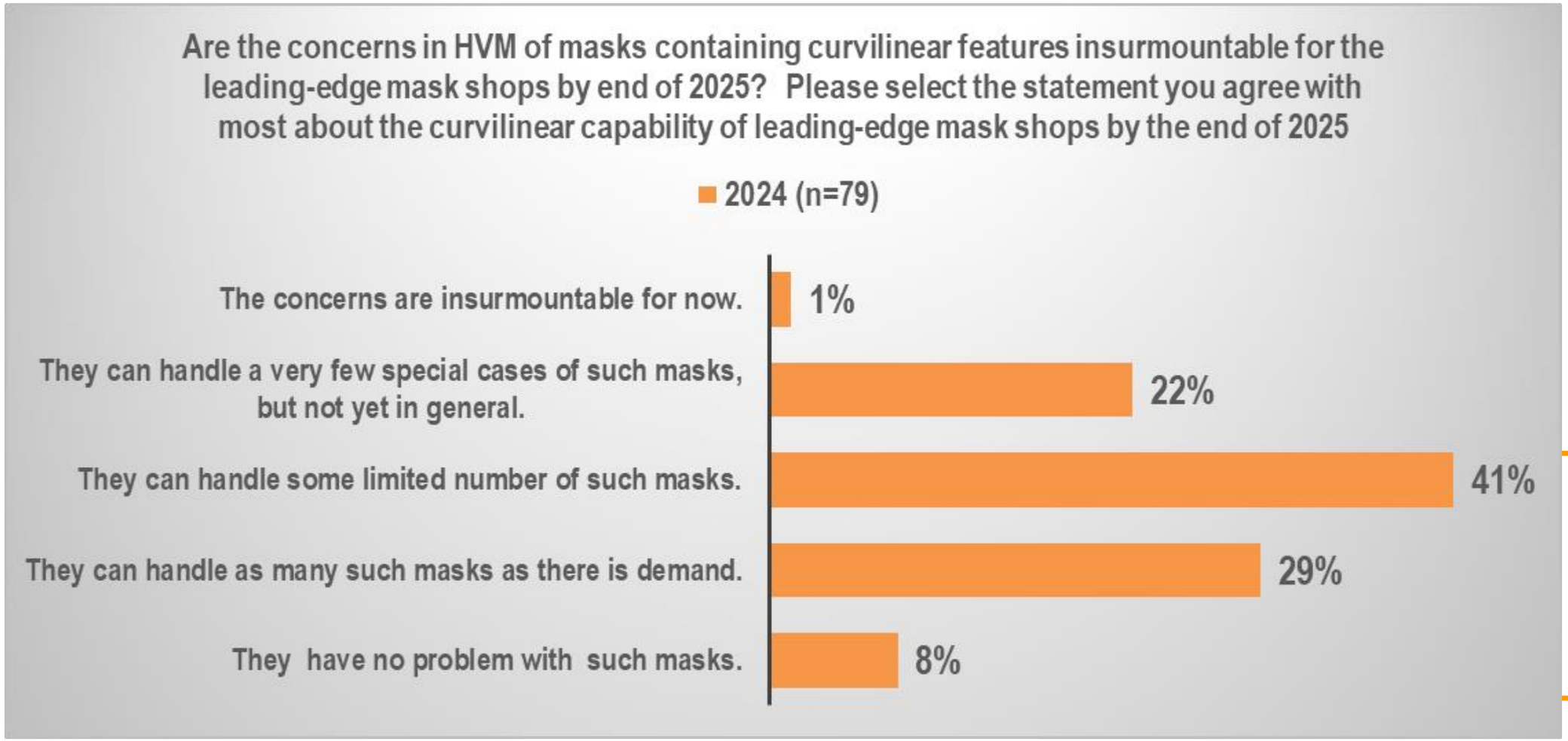
N/A=11%

Note: 1-6 on X-axis indicate # of respondents that ranked that question as that ordinal number with 1 = highest; height of chart = weighted avg

* The survey question included "Curvilinear shapes can be piecewise linear polygons of some resolution, Bezier, B-spline or other curved-edge descriptions, but excludes shapes that only contain Manhattan or 45-degree straight edges."

78% Say Mask Shops Can Handle Curvilinear Masks by 2025

Versus 87% who said that last year for the end of 2023



eBeam Initiative Luminaries Predict 2024 Mask Market Growth

13th Annual Luminaries Survey - July 2024

- 100% of Luminaries say **2024 mask revenues will increase (74%) or stay the same (26%) over 2023** revenues of $5.4B reported by SEMI.

- **Positive outlook for purchasing new equipment** in the next 3 years with increases predicted for multi-beam mask writers (93%), mask inspection (85%) and laser mask writers (48%).

- Confidence increased that **fabs without EUV can reach 5nm in next 7 years** with 19% who say that this year compared to 12% last year.

- 81% of Luminaries surveyed think that stitching for high-NA EUV masks will require **designers to be aware of the stitching boundaries during design.**