光伏制造规范正式稿出台，提高扩产门槛，利好龙头企业促进秩序回归

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投资要点：

- **本周周观点：**工信部发布《光伏制造行业规范条件》和《光伏制造行业规范公告管理暂行办法》，相比征求稿更严，正式稿对硅料、硅片、电池片的生产指标要求均提高，其中硅料的电耗指标进一步趋紧，硅片和电池的扩产新增了水耗方面要求。我们认为政策正全面加强能耗控制，硅片和电池片的扩产将受到政策在技术和能耗方面的双重制约，二线企业扩产进一步受限，有助于限制行业产能、促进秩序回归、利好行业向龙头。产业链价格方面，本周 CPIA 发布 11 月上旬组件含税成本 0.69 元/W，统一行业认知，抑制光伏产品低于成本价竞争。我们认为，当前政策对光伏行业无论是产能还是价格都给出了明确的指引和措施，光伏行业摆脱低价恶性竞争已是大势所趋，向新技术、高品质、龙头化的方向发展，行业价格拐点趋势已确立，行业秩序逐步回归，建议重视光伏底部拐点带来的巨大弹性。

- **本周关注组合：**电池硅料（**通威股份，钧达股份，协鑫科技**），新技术（**隆基绿能、爱旭股份、帝尔激光、迈为股份**），逆变器（**阳光电源、德业股份**）。

- **工信部发布《光伏制造行业规范条件》和《光伏制造行业规范公告管理暂行办法》2024 修订版。**主要内容包括：（1）光伏制造项目电耗要求，其中多晶硅新建和改扩建项目综合电耗小于 53 千瓦时/千克。（2）生产水耗要求，其中硅片新建和改扩建项目水耗低于 540 吨/百万片且再生水使用率高于 40%。（3）提高技术指标要求，多晶硅电池、P 型单晶硅电池和 N 型单晶硅电池（双面电池按正面效率计算）的平均光电转换效率分别不低于 21.7%、23.7%和 26%。多晶硅组件、P 型单晶硅组件和 N 型单晶硅组件（双面组件按正面效率计算）的平均光电转换效率分别不低于 19.7%、21.8%和 23.1%。

- **产业链价格基本持平。**根据 Infolink Consulting 公众号 11 月 20 日最新报价，致密料均价为 40 元/kg，环比持平；硅片端，P 型 182/210 硅片均价分别为 1.15、1.70 元/片，环比均持平；N 型 182/210 硅片均价分别为 1.03、1.42 元/片，环比分别持平和下降上涨 0.03 元/片；电池端，PERC 电池 182/210 均价分别为 0.275、0.280 元/W，环比均持平；TOPCON 电池均价 0.275 元/W，环比上涨 0.005 元/W；组件端，双玻 182/210 PERC 组件均价分别为 0.68、0.69 元/W，环比均持平；中国集中式、分布式均价分别为 0.68、0.70 元/W，环比均持平；TOPCon 组件印度、美国、欧洲组件分别为 0.095、0.27、0.10 美元/W，环比均持平；辅材端，3.2mm/2.0mm 镀膜光伏玻璃均价分别为 21.25、12.5 元/平方米，环比均持平。

- **最新一周涨跌幅排名靠后。**我们选取 52 家光伏企业作为样本，光伏板块最近一周涨跌幅-4.17%，跑输沪深 300 指数 2.06 个百分点，相比 SW 行业分类各板块排名靠后。年初以来光伏板块累计涨跌幅为-2.87%，跑输沪深 300 指数 26.57 个百分点，相比 SW 行业各类板块排名靠后。

- **风险提示。**行业政策波动风险；竞争加剧风险；新技术替代风险；产品价格波动风险。

1. 光伏产业链价格跟踪

根据 Infolink Consulting 公众号，最新光伏价格更新如下：

多晶硅：致密料均价为 40.0 元/kg，环比持平；

硅片：P 型 182/210 硅片均价分别为 1.15、1.70 元/片，环比均持平；N 型 182/210 硅片均价分别为 1.03、1.42 元/片，环比分别持平和下降上涨 0.03 元/片；

电池：PERC 电池 182/210 均价分别为 0.275、0.280 元/W，环比均持平；TOPCON 电池均价 0.275 元/W，环比上涨 0.005 元/W；

组件：双玻 182/210 PERC 组件均价分别为 0.68、0.69 元/W，环比均持平；中国集中式、分布式均价分别为 0.68、0.70 元/W，环比均持平；TOPCon 组件印度、美国、欧洲组件分别为 0.095、0.27、0.10 美元/W，环比均持平。

玻璃：3.2mm/2.0mm 镀膜光伏玻璃均价分别为 21.25、12.5 元/平方米，环比均持平。

表 1 光伏产业链周度价格（Infolink Consulting ——2024.11.14-2024.11.20）

	最高价	最低价	均价	涨跌幅(%)	涨跌幅()
多晶硅					
多晶硅致密料（元/kg）	43.0	37.5	40.0	0.0%	0
硅片					
单晶 P 型硅片-182mm/150µm（元/片）	1.20	1.10	1.15	0.0%	0
单晶 P 型硅片-210mm/150µm（元/片）	1.70	1.65	1.70	0.0%	0
单晶 N 型硅片-182mm/130µm（元/片）	1.03	1.00	1.03	0.0%	0
单晶 N 型硅片-210mm/130µm（元/片）	1.43	1.38	1.42	-2.1%	-0.03
电池片					
单晶 PERC 电池片-182mm/23.1%（元/W）	0.28	0.26	0.275	0.0%	0
单晶 PERC 电池片-210mm/23.1%（元/W）	0.285	0.27	0.28	0.0%	0
TOPCon 电池片-182mm（元/W）	0.28	0.27	0.275	1.9%	0.005
组件					
双面双玻：182 单晶 PERC 组件（元/W）	0.72	0.65	0.68	0.0%	0
双面双玻：210 单晶 PERC 组件（元/W）	0.73	0.67	0.69	0.0%	0
中国项目-集中式项目（元/W）	0.70	0.62	0.68	0.0%	0
中国项目-分布式项目（元/W）	0.73	0.65	0.70	0.0%	0
单晶 PERC 组件-印度本土（$/W）	0.180	0.150	0.165	0.0%	0
单晶 TOPCon 组件-印度（$/W）	0.105	0.080	0.095	0.0%	0
单晶 PERC 组件-美国（$/W）	0.270	0.200	0.240	0.0%	0
单晶 TOPCon 组件-美国（$/W）	0.300	0.220	0.270	0.0%	0
单晶 PERC 组件-欧洲（$/W）	0.180	0.070	0.090	0.0%	0
单晶 TOPCon 组件-欧洲（$/W）	0.110	0.085	0.100	0.0%	0
组件辅材					
光伏玻璃 3.2mm 镀膜（元/㎡）	21.5	21.0	21.25	0.0%	0
光伏玻璃 2.0mm 镀膜（元/㎡）	12.5	12.5	12.5	0.0%	0

资料来源：Infolink Consulting 公众号，HTI

根据中国有色金属工业协会硅业分会微信公众号价格统计：本周（截至 2024 年 11 月 20 日，下同）本周多晶硅价格小幅下调。n 型棒状硅成交价格区间调整至 3.70-4.20 万元/吨，成交均价为 4.05 万元/吨；P 型单晶致密料成交价格区间维持在 3.30-3.60 万元/吨，成交均价为 3.43 万元/吨；N 型颗粒硅成交价格区间维持至 3.60-3.75 万元/吨，成交均价为 3.70 万元/吨。

本周多晶硅成交量一般，新签单大多都为跌价或稳价成交。本周 n 型多晶硅有成交的企业数量为 4 家。目前新进企业质量较好且具备价格优势的产品占据一定市场需求。另外，对于 n 型高品质致密料的采购较少，对珊瑚料占比较高的混包料则保有一定需求，采购重心有所转移，部分大厂降价成交。

造成本周多晶硅价格变动的原因如下：以现在的下游需求来看，小幅下调价格已经无法刺激需求增长，只有足够低的价格才能推动大单成交，因此规模性成交不容易达成共识。其次，较大的库存存量导致多晶硅买家议价权不断拉大，尽管多晶硅企业本月积极减产，但供需关系未出现根本性改善，硅料价格趋于松动。

截至目前，处于检修或降负荷状态中的企业数量为 15 家，其中，1 家企业本月开始逐步减产。另有 1 家企业月内恢复部分产能，1 家新投产企业产能持续爬坡。2024 年 10 月我国多晶硅进口量 2374.9 吨，环比减少 7.09%。我国多晶硅出口量 2624.0 吨，环比减少 20.74%。

表 2 光伏多晶硅周度价格（硅业分会—— 2024.11.14-2024.11.20；万元/吨）

项目	最高价	最低价	均价	波动	波动%
N 型料成交价	4.20	3.70	4.05	-0.12	-2.88%
复投料成交价	4.00	3.50	3.62	-0.02	-0.55%
单晶致密料成交价	3.60	3.30	3.43	-0.02	-0.58%
单晶菜花料成交价	3.30	3.00	3.13	-0.01	-0.32%
N 型颗粒硅	3.75	3.60	3.70	-0.03	-0.80%

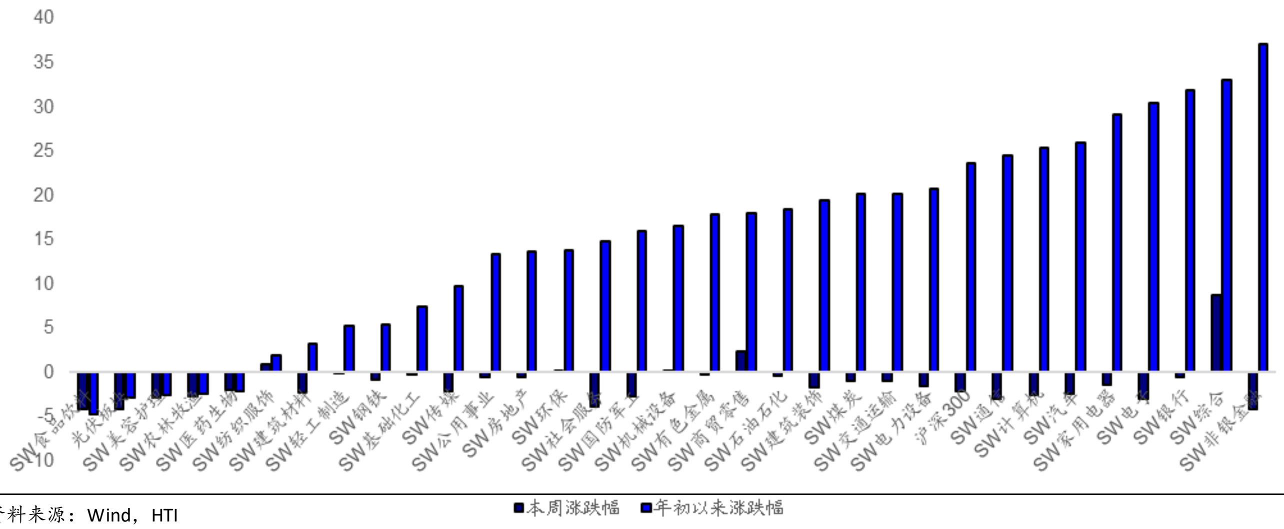
资料来源：中国有色金属工业协会硅业分会微信公众号，安泰科，HTI

2. 板块涨跌幅及估值情况

我们选取 52 家光伏企业作为光伏板块的样本公司，与其他板块做对比。

根据 Wind 数据，光伏板块最近一周涨跌幅-4.17%，跑输沪深 300 指数 2.06 个百分点，相比 SW 行业分类各板块排名靠后。年初以来光伏板块累计涨跌幅为-2.87%，跑输沪深 300 指数 26.57 个百分点，相比 SW 行业各类板块排名靠后。

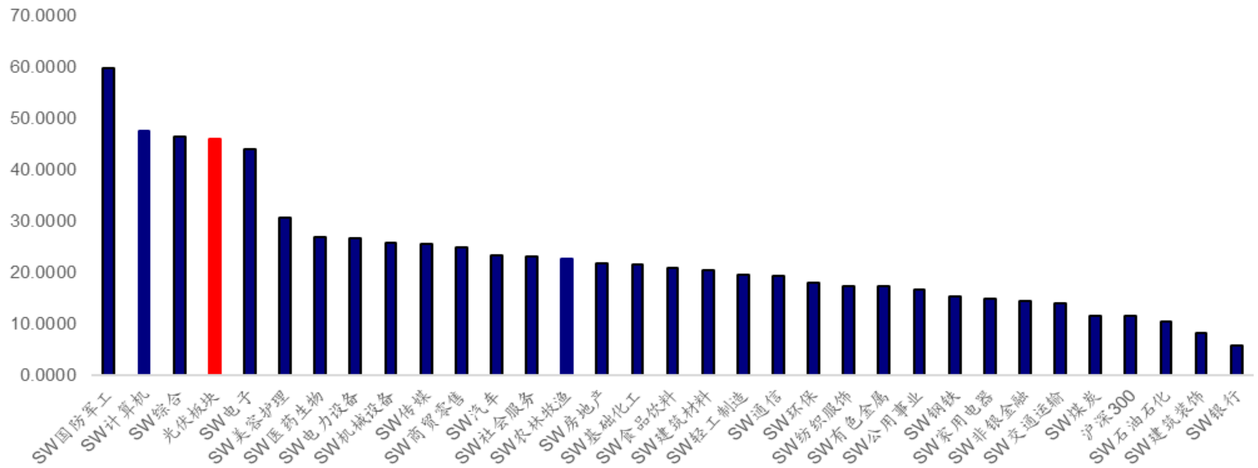
图1 各板块最近一周及年初以来涨跌幅对比———总市值加权平均（2024.11.16-2024.11.22；%）



资料来源：Wind，HTI

估值方面，光伏板块 2024 年 11 月 22 日的市盈率（TTM，整体法）估值为 46.08 倍，与 SW 行业分类各板块相比，排名靠前。

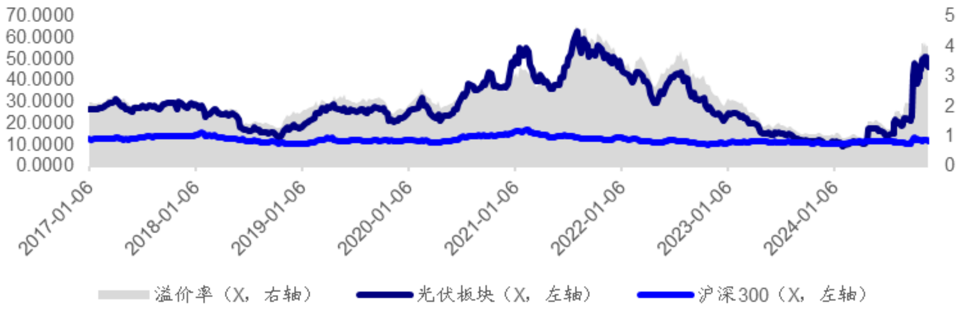
图2 各板块 2024 年 11 月 22 日的市盈率（TTM，整体法，X）



资料来源：Wind，HTI

从估值变化趋势来看，光伏板块的市盈率（TTM，整体法）估值自 21 年底以来持续下降，今年 9 月开始回升。

图3 光伏板块历史估值及与沪深 300 对比：市盈率（TTM，整体法，X）



资料来源：Wind，HTI

3. 重点事项

工信部发布《光伏制造行业规范条件》和《光伏制造行业规范公告管理暂行办法》

工业和信息化部对《光伏制造行业规范条件（2021 年本）》《光伏制造行业规范公告管理暂行办法（2021 年本）》进行修订，并于 2024 年 11 月 15 日印发了《光伏制造行业规范条件（2024 年本）》《光伏制造行业规范公告管理办法（2024 年本）》（以下简称《规范条件》《管理办法》）。

据工信微报公众号，《规范条件》下现有光伏制造企业及项目产品应满足以下要求：

1、多晶硅满足《太阳能级多晶硅》（GB/T 25074）或《流化床法颗粒硅》（GB/T 35307）特级品的要求。

2、多晶硅片（含准单晶硅片）少子寿命不低于 2μs，碳、氧含量分别小于 10ppma 和 12ppma；P 型单晶硅片少子寿命不低于 80μs，N 型单晶硅片少子寿命不低于 800μs，碳、氧含量分别小于 1ppma 和 12ppma，其中异质结电池用 N 型单晶硅片少子寿命不低于 500μs，碳、氧含量分别小于 1ppma 和 14ppma。

3、多晶硅电池、P 型单晶硅电池和 N 型单晶硅电池（双面电池按正面效率计算）的平均光电转换效率分别不低于 21.4%、23.2%和 25%。

4、多晶硅组件、P 型单晶硅组件和 N 型单晶硅组件（双面组件按正面效率计算）的平均光电转换效率分别不低于 19.4%、21.2%和 22.3%。

5、硅基、铜铟镓硒（CIGS）、碲化镉（CdTe）及钙钛矿等其他薄膜组件的平均光电转换效率分别不低于 12%、15%、15%、14%。

6、含变压器型的光伏逆变器中国加权效率不得低于 96.5%，不含变压器型的光伏逆变器中国加权效率不得低于 98%（单相二级拓扑结构的光伏逆变器相关指标分别不低于 94.5%和 97.3%），微型逆变器相关指标分别不低于 95%和 95.5%。

新建和改扩建企业及项目产品应满足以下要求：

1、多晶硅满足《电子级多晶硅》（GB/T 12963）3 级品以上要求或《流化床法颗粒硅》（GB/T 35307）特级品的要求。

2、多晶硅片（含准单晶硅片）少子寿命不低于 2.5μs，碳、氧含量分别小于 6ppma 和 8ppma；P 型单晶硅片少子寿命不低于 90μs，N 型单晶硅片少子寿命不低于 1000μs，碳、氧含量分别小于 1ppma 和 12ppma，其中异质结电池用 N 型单晶硅片少子寿命不低于 700μs，碳、氧含量分别小于 1ppma 和 14ppma。

3、多晶硅电池、P 型单晶硅电池和 N 型单晶硅电池（双面电池按正面效率计算）的平均光电转换效率分别不低于 21.7%、23.7%和 26%。

4、多晶硅组件、P 型单晶硅组件和 N 型单晶硅组件（双面组件按正面效率计算）的平均光电转换效率分别不低于 19.7%、21.8%和 23.1%。

5、CIGS、CdTe 及钙钛矿等其他薄膜组件的平均光电转换效率分别不低于 16%、16.5%、15.5%。

P 型晶硅组件衰减率首年不高于 2%，后续每年不高于 0.55%，25 年内不高于 15%，N 型晶硅组件衰减率首年不高于 1%，后续每年不高于 0.4%，25 年内不高于 11%；薄膜组件衰减率首年不高于 4%，后续每年不高于 0.4%，25 年内不高于 14%。

光伏制造项目电耗应满足以下要求：

1、现有多晶硅项目还原电耗小于 46 千瓦时/千克，综合电耗小于 60 千瓦时/千克；新建和改扩建项目还原电耗小于 40 千瓦时/千克，综合电耗小于 53 千瓦时/千克。

2、现有硅锭项目平均综合电耗小于 7.5 千瓦时/千克，新建和改扩建项目小于 6.5 千瓦时/千克；如采用多晶铸锭炉生产准单晶或高效多晶产品，项目平均综合电耗的增加幅度不得超过 0.5 千瓦时/千克。

3、现有硅棒项目平均综合电耗小于 26 千瓦时/千克，新建和改扩建项目小于 23 千瓦时/千克。

4、现有多晶硅片项目平均综合电耗小于 25 万千瓦时/百万片，新建和改扩建项目小于 20 万千瓦时/百万片；现有单晶硅片项目平均综合电耗小于 10 万千瓦时/百万片，新建和改扩建项目小于 8 万千瓦时/百万片。

5、P 型晶硅电池项目平均综合电耗小于 5 万千瓦时/MWp，N 型晶硅电池项目平均综合电耗小于 7 万千瓦时/MWp。

6、晶硅组件项目平均综合电耗小于 2.5 万千瓦时/MWp，薄膜组件项目平均电耗小于 40 万千瓦时/MWp。

光伏制造项目生产水耗应满足以下要求：

1、多晶硅项目水重复利用率不低于 98%。

2、现有硅片项目水耗低于 900 吨/百万片，鼓励企业使用再生水；新建和改扩建硅片项目水耗低于 540 吨/百万片且再生水使用率高于 40%。

3、现有 P 型晶硅电池项目水耗低于 400 吨/MWp，N 型晶硅电池项目水耗低于 600 吨/MWp，鼓励企业使用再生水；新建和改扩建项目水耗低于 360 吨/MWp 且再生水使用率高于 40%。

中国光伏行业协会 CPIA 发布光伏主产业链产品成本数据

中国光伏行业协会 CPIA 公众号发布 2024 年 11 月上旬光伏主流产品（N 型 M10 及 G12R）各环节综合成本数据。当前，在各环节不计折旧，硅料、硅片、电池片环节不含增值税的情况下，最终组件含税成本（含最低必要费用）为 0.690 元/W。最低必要费用为综合考虑不同企业工厂到项目地距离不等、企业交货方式存在差异、组件需考虑质保等因素的费用，据调研目前组件运费为 0.015 元/W/千公里，且存在运费波动情况，不同项目实际执行时，对运费和组件质保要求不尽相同，该费用只考虑最低情况下的成本。

考虑当前行业严重供过于求、企业为消化库存正在极限经营的现状，上述成本测算结果并未将折旧纳入，低于实际生产成本，更低于包含三费的全成本；已经是当前行业优秀企业在保证产品质量前提下的最低成本。成本模型对成本要素进行了综合考量，结构完整，设计合理；数据的收集范围具有广泛代表性，体现了先进光伏产品的行业平均成本水平；成本数据的收集及上报，将对主管部门了解行业情况、加强行业管理提供重要工具；对于统一行业认知，抑制光伏产品低于成本价竞争具有重要意义。

4. 风险提示

（1）行业政策波动风险；

（2）竞争加剧风险；

（3）新技术替代风险；

（4）产品价格波动风险。

APPENDIX 1

Summary

Investment Highlights:

This week, the Ministry of Industry and Information Technology released stricter regulations for the PV manufacturing industry, raising production standards for silicon materials, wafers, and cells. Energy consumption for silicon materials is tightened, and water usage requirements are added for wafer and cell expansion. Policies aim to control energy use, limiting expansion for second-tier companies, benefiting industry leaders. CPIA reported November's component cost at RMB 0.69/W, aligning industry understanding and curbing below-cost competition. The trend is towards high-quality, leading technology, with a price turning point established. Focus on PV bottom elasticity. This week's focus: silicon materials (Tongwei, Hainan Drinda Automotive Trim, GCL Technology Holdings), new technology (Longi Green Energy Technology, Shanghai Aiko Solar Energy, Wuhan Dr Laser, Suzhou Maxwell Technologies), inverters (Sungrow Power Supply, Ningbo Deye Technology). The 2024 revision includes: (1) Energy consumption for new/expanded polysilicon projects under 53 kWh/kg. (2) Water usage for new/expanded wafer projects under 540 tons/million wafers, with over 40% recycled water. (3) Efficiency standards: polysilicon cells ≥21.7%, P-type monocrystalline ≥23.7%, N-type monocrystalline ≥26%. Component efficiency: polysilicon ≥19.7%, P-type monocrystalline ≥21.8%, N-type monocrystalline ≥23.1%. Prices stable: Dense material at RMB 40/kg; P-type 182/210 wafers at RMB 1.15/1.70 each; N-type 182/210 at RMB 1.03/1.42 each; PERC cells at RMB 0.275/0.280/W; TOPCON cells at RMB 0.275/W; dual-glass 182/210 PERC components at RMB 0.68/0.69/W; centralized/distributed in China at RMB 0.68/0.70/W; TOPCon components in India, USA, Europe at USD 0.095/0.27/0.10/W; 3.2mm/2.0mm coated PV glass at RMB 21.25/12.5 per square meter. Recent week PV sector fell 4.17%, underperforming CSI 300 by 2.06 percentage points. Year-to-date, PV sector fell 2.87%, underperforming CSI 300 by 26.57 percentage points.

Risk Warning: Policy fluctuation risk; intensified competition risk; new technology substitution risk; product price fluctuation risk.

附录 APPENDIX

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中性，未来 12-18 个月内预期相对基准指数变化不大，基准定义如下。根据 FINRA/NYSE 的评级分布规则，我们会将中性评级划入持有这一类别。

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评级分布 Rating Distribution

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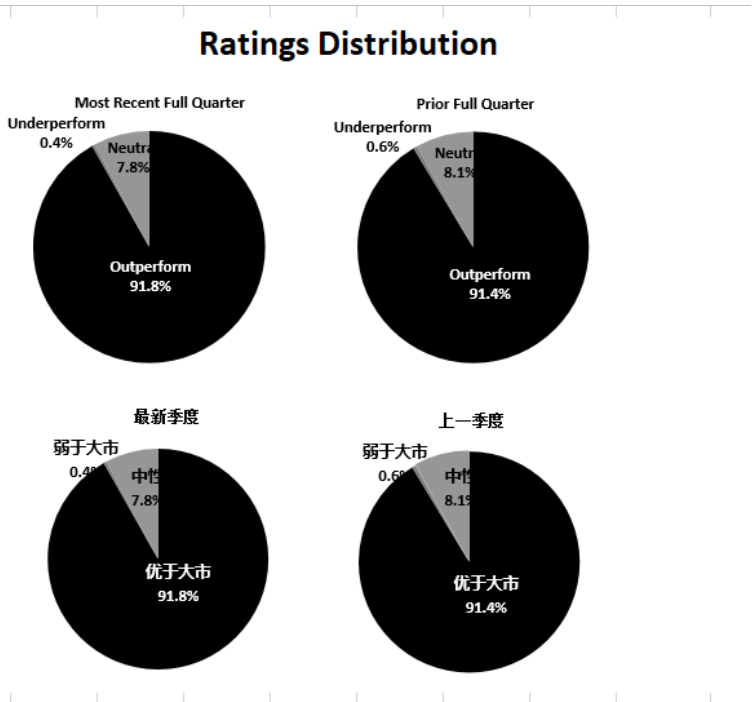

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各地股票基准指数：日本 – TOPIX, 韩国 – KOSPI, 台湾 – TAIEX, 印度 – Nifty100; 其他所有中国概念股 – MSCI China.

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