Rhodium Group

Appendix: Methodology of Output Calculations

Lithium-ion battery sector

FINAL DEMAND / GDP / TOTAL OUTPUT ESTIMATES

Connection to input-output (I/O) table: The lithium-ion battery sector is part of the battery sector in the I/O table. We first estimate the total output of lithium-ion batteries from information independent from the I/O table. Then we assume the ratios between total output, GDP, and final demand of the lithium-ion battery sector will follow the same trends as that of the battery sector within the I/O table (for instance, if the proportion of final demand within total output is rising, then we linearly project the 2025 proportion based on the existing trends in 2018, 2020, and 2023; if there is no trend, we'll take the average of historical proportions as the 2025 proportion) to derive the final demand and GDP from the lithium-ion battery sector.

Methodology: Lithium-ion battery total output was estimated by multiplying the output volume and prices derived from sales data of lithium-iron phosphate (LFP) and nickel cobalt manganese (NCM) batteries, power and energy storage batteries, and domestic sales and exports. Data was sourced from MySteel and the General Administration of Customs. Based on estimated total output values, we further calculated the corresponding GDP and final demand with reference to trends in historical proportions of GDP and final demand within total output of the battery sector in I/O tables in 2018, 2020, and 2023.

Caveats: Net exports of upstream products that Customs reported were negative by $1.1 billion in Jan-Nov 2025. The import data for lithium ores is incomplete: Spodumene import and export data is only available from 2025 and data concerning other ores was not disclosed. It's also difficult to determine the volume of upstream products that ended up in inventory compared to final demand and intermediate usage, and thus they were excluded.

INVESTMENT ESTIMATES

Connection to I/O table: These estimates have no direct connection to the I/O table.

Methodology: Investment estimates include the downstream lithium-ion battery sector as well as upstream sectors of lithium carbonate, lithium hydroxide, LFP cathodes and precursors, NCM cathodes and precursors, and anode manufacturing. The investment value is estimated by multiplying capacity growth (using data from MySteel) and the unit investment needed for each product covered (using data from Rhodium Group's Global Clean Investment Monitor).

Caveats: Mining activities related to lithium ores and other raw materials are not included. Due to data availability, some capacity data series we used include active capacity instead of total capacity. There could be some variance in active capacity growth and real capacity growth. Unit-level investment is cited from preliminary data within Rhodium Group's Global Clean Investment Monitor, with two caveats worth noting: limited coverage of projects updated in 2025 and potential overstatement if an integrated project produces multiple products.

Solar sector

GDP / TOTAL OUTPUT ESTIMATES

Connection to I/O table: The solar sector is part of the power transmission, distribution, and control equipment sector in the I/O table. We first estimate solar products' total output values from information independent from the I/O table. Then we assume the ratios between total output, GDP, and final demand of the solar sector will follow the same trends as the power transmission, distribution, and control equipment sector within the I/O table. For instance, if the proportion of final demand within total output is rising, then we linearly project the 2025 proportion based on the existing trend in 2018, 2020, and 2023. If there is no trend, we'll take average of historical proportions as the 2025 proportion to derive final demand and GDP for the solar sector.

Methodology: Output value of the solar sector is estimated by summing the value of solar module output which was not exported and net exports of the upstream polysilicon, silicon wafer, and solar cell sectors and the downstream solar module sector (here using data from MySteel and Customs). Based on estimated total output values, we further calculate corresponding GDP and final demand with reference to trends in historical proportions of GDP within total output of the power transmission, distribution and control equipment sector in I/O tables in 2018, 2020, and 2023.

Caveat: We could not account for upstream sector output which could end up within inventories.

INVESTMENT ESTIMATES

Connection to I/O table: These estimates have no direct connection to the I/O table.

Methodology: Investment estimates include the downstream solar module sector as well as upstream sectors of polysilicon, silicon wafer, and solar cell manufacturing. The investment value is estimated by multiplying capacity growth (using data from MySteel) and unit investment needed for each product (using data from the Global Clean Investment Monitor).

Caveat: Due to data availability, some capacity data series we used reflect active capacity instead of total capacity. There could be some variance in active capacity growth and real capacity growth. Unit investment is cited from preliminary data within Rhodium Group's Global Clean Investment Monitor, with the same two caveats that were previously mentioned: limited coverage of projects updated in 2025 and potential overstatement if an integrated project produces multiple products.

Auto sector

FINAL DEMAND / GDP / TOTAL OUTPUT ESTIMATES

Connection to I/O table: The ICE vehicle and NEV manufacturing sectors are listed in the 2023 I/O table. The 2023 values come directly from the I/O table. For 2025, we first estimate final demand values of ICE vehicles and NEVs from information independent from the I/O table. Then we calculate the divergence between our series of estimates and I/O table final demand values in 2023 and assume the same level of divergence in proportional terms will occur in 2025, in order to adjust our 2025 estimates. Then we assume the ratios between total output, GDP, and final demand of the ICE vehicle and NEV sectors to be at the same level as those in the 2023 I/O table to derive their total output and GDP for these sectors in 2025.

Methodology: Final demand for the ICE vehicle and NEV sectors is estimated by summing their passenger car retail sales values, commercial vehicle domestic sales values, and net exports (based on data from CPCA, CAAM, NDRC price monitor, and Customs). Then the values are adjusted based on the divergence of the estimates compared to final demand values in the 2023 I/O table. This step is necessary (especially for NEVs) due to the overstatement of retail sales through zero-mile second-hand cars, which were not actually sold to end users or could end up in exports, resulting in double counting. Based on estimated final demand values, we further calculate corresponding total output and GDP for the sector with reference to the ratios of GDP and total output to final demand of the ICE vehicle and NEV sectors in the 2023 I/O table.

Note: Lithium-ion battery input in NEV production is estimated by multiplying domestic prices of power batteries and the volume of power batteries installed in vehicles. It was removed while summing up the total contribution to GDP of the "new three" + power construction industries to avoid double counting.

INVESTMENT ESTIMATES

Connection to I/O table: These estimates have no direct connection to the I/O table.

Methodology: Auto sector FAI is based on the NBS 2017 value and the annual growth rates disclosed by the NBS thereafter. All FAI is assigned to the NEV sector, given that capacity additions of ICE vehicles were very limited in recent years given the prolonged decline of ICE car sales. It's worth noting that capacity growth estimated based on Marklines OEM plant data showed a significant drop in NEV capacity growth in 2025 compared to 2023. However, FAI data for the sector showed significant growth in investment. This could be attributed to more spending on production line automation (including robotics development) and automated driving system development (testing facilities and compute infrastructure for model training). Spending in these areas is not necessarily only limited to applications in NEV manufacturing, but these upgrading features should be mainly focused on NEVs given that launches of most new auto models are NEVs.

Charging infrastructure investment estimates are based on assumed average power produced by private and public charging piles, investment per watt, and data concerning the numbers of charging piles installed (based on MySteel data and industrial estimates in media reports).

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AI and robotics sectors

TOTAL OUTPUT ESTIMATES

Connection to I/O table: These estimates have no direct connection to the I/O table.

Methodology: The total output estimates are based on indicators disclosed by MIIT, China Academy of Information and Communications Technology (CAICT), and industrial associations.

INVESTMENT ESTIMATES

Connection to I/O table: These estimates have no direct connection to the I/O table.

Methodology: The investment estimates are based on the financial data of listed companies in selected sectors (AI chip design and foundries, robot production, and robot part manufacturing). Their investment is estimated by calculating annual additions in the total of fixed assets and construction in progress (adding back depreciation and impairment loss). Then we assume companies invest at levels comparable to their market share in sales. Total investment is thus estimated by dividing listed company investment by their domestic market share. AI infrastructure investment is treated differently since its value was given by CAICT as part of AI sector output.

Caveat: AI chip imports were not deducted.

Traditional and power construction sectors

PROPERTY ESTIMATES

Connection to I/O table: The property sector is comprised of the property service and residential housing construction sectors of the I/O table. The 2023 values come directly from the I/O table. For 2025, we first estimate the values of final demand and GDP for property services and residential housing construction sectors from information independent of the I/O table. Then we calculate the divergence between our estimates and the I/O table values in 2018, 2020, and 2023 and assume the level of divergence in 2025 will follow the previous trends. For instance, if the divergence from the I/O table values is rising, then we linearly project the 2025 change based on the existing trend in 2018, 2020, and 2023. If there is no trend, we'll take the average of historical differences to adjust our 2025 estimates.

Methodology: The 2025 values of the property service and residential housing construction sectors are estimated based on real estate construction investment and real estate sector GDP disclosed by NBS respectively, which are then adjusted based on their divergence against final demand values in the 2018, 2020, and 2023 I/O tables.

Caveat: The property sector's total final demand should be understated given the omission of commercial property construction, installations, and equipment purchases.

TRADITIONAL INFRASTRUCTURE ESTIMATES

Connection to I/O table: The traditional infrastructure sector is comprised of three sectors of the 2023 I/O table: railway, road, tunnel and bridge engineering construction;

water conservancy, water transportation engineering and marine engineering construction; and wiring, pipeline engineering construction and energy saving and environmental protection projects. The 2023 values come directly from the I/O table.

For 2025, we first estimate final demand values of the three sectors from information independent from the I/O table. Then we calculate the divergence between our estimates and the I/O table values in 2018, 2020, and 2023 and assume the level of divergence in 2025 will follow the previous trends. For instance, if the divergence from the I/O table values is rising, then we linearly project the 2025 change based on the existing trend in 2018, 2020, and 2023; if there is no trend, we'll take the average of historical differences to adjust our 2025 estimates. Then we assume the ratios between total output, GDP, and final demand of the three sectors will follow the same trends as those in the I/O table to derive total output and GDP for these sectors in 2025.

Methodology: The 2025 values of the three sectors are estimated based on highway, railroad, waterway, pipeline, water conservancy, and environmental protection investment disclosed by the Ministry of Transport and NBS respectively, which are then adjusted based on their divergence against final demand values in the 2018, 2020, and 2023 I/O tables.

Caveat: The traditional infrastructure sectors listed above are different from and narrower than the NBS definition.

POWER CONSTRUCTION ESTIMATES

Connection to I/O table: The power construction sector is listed in the 2023 I/O table. The 2023 values come directly from the I/O table. For 2025, we first estimate final demand values for the power construction sector from information independent from the I/O table. Then we estimate the divergence between our series of estimates and the final demand values in the I/O table in 2023, and assume the same level of divergence in proportional terms will occur in 2025, in order to adjust our 2025 estimates. Then we assume the ratios between total output, GDP, and final demand of the power construction sector will be set at the same level as those in the 2023 I/O table to derive total output and GDP for the sector in 2025.

Methodology: The 2025 value is estimated based on electricity construction investment disclosed by the China Electricity Council, which is then adjusted based on its divergence against the level from the 2023 I/O table.

Caveat: Lithium-ion battery input was not deducted while summing up the impact of the "new three" and power construction sectors. This is due to limited data on the volume of lithium-ion batteries installed, but batteries still remained a small input (2% within total output in 2023).

Estimates of 2025 full-year data

2025 full-year numbers are predicted based on existing data trends in Jan-Nov or Q1-Q3. Then the growth rates for the previous month or quarter are estimated assuming y/y, q/q, or m/m growth rates persist, whichever are a better fit within the historical series.