07 Jul 2026 04:00:10 ET | 62 pages

Taiwan Electronic Components & Equipment

Deep Dive

Riding the AIDC BBU Growth Cycle; Initiate Dynapack at Buy

Angela Hsu AC
+886-2-8726-9083
angela.hc.hsu@citi.com

CITI'S TAKE

We believe AI infrastructure is entering a new power architecture cycle, where rising power density is driving a structural shift from centralized UPS toward rack-level backup power. We expect this transition to significantly increase both BBU content value per rack and industry penetration over the next several years, creating a multi-year growth opportunity that remains underappreciated by the market. We initiate Dynapack at Buy with TP NT$800 (32x 2027E P/E) as we believe it is one of the most direct beneficiaries of this structural transition. Boosted by accelerating BBU demand, improving product mix and expanding profitability, we forecast 34% sales CAGR and 60% earnings CAGR over 2025-2028E.

AI power architecture is shifting toward distributed backup power, making BBU increasingly essential — Battery Backup Unit (BBU) is emerging as a key enabling technology in next gen AIDC as rack power density continues to rise. Compared with centralized UPS, localized backup power provides faster ride-through capability, lower power conversion losses and better scalability. We believe this represents a structural evolution in AI power architecture, making BBU an increasingly standard component in high-density AI racks.

We see both BBU content value and penetration expanding meaningfully as AI power architecture evolves — Based on our bottom-up module approach, we estimate BBU content value per AI rack rises from c.US$15-16K today for GB300 NVL72 to US$17-18K for Rubin and could exceed US$33K under Rubin Ultra as higher-power BBU modules become necessary. We also estimate BBU penetration increases from 40-45% in 2025 to 60-65% in 2026 and above 85% in 2027, supported by the adoption of rack-scale architectures and HVDC power distribution. We believe the combination of rising content value and penetration creates a compelling structural growth opportunity for the BBU ecosystem.

Initiate Dynapack at Buy with TP NT$800 as we view it as the most direct beneficiary of the strong BBU growth cycle — We believe the company is well positioned to benefit from the structural migration toward rack-level backup power, capturing accelerating BBU demand as AI rack power increases, driving 34% group sales CAGR in 2025-2028E, supported by 74% CAGR in non-IT sales. With product mix shifting toward high-margin BBU products, we forecast GPM to reach 28.4% in 2028E from 16.6% in 2025, driving 60% earnings CAGR over 2025-2028E. We assign a 32x target P/E on our 2027E EPS of NT$25 to derive our TP NT$800.

Prefer Dynapack over AES — While AES remains the dominant BBU supplier given its scale, customer relationships, and technology leadership, we believe Dynapack offers a more attractive risk-reward profile at the current stage of the AI infrastructure investment cycle, as its earnings remain in the early phase of a multi-year growth and margin expansion story. We estimate 60% earnings CAGR over 2025-2028E for Dynapack vs. AES's 27% driven by product mix improvement and stronger op leverage.

Data Summary

						Rating		Short-Term	Target Price						Current Fiscal Year EPS		Next Fiscal Year EPS	
Company	Ticker	Ccy	Price	Mkt Cap (M)	Date & Time	Old	New	View	Old	New	ESPR (%)	Div Yld (%)	ETR (%)	Last Rpt Yr	Old	New	Old	New
Advanced Energy Solution	6781.TW	NT$	1,250.00	106,773	06 Jul 13:30	1	nc	-	1,660.00	1,680.00	34.4	1.8	36.2	Dec-25	51.89	46.35	65.91	61.35
Dynapack International	3211.TWO	NT$	422.50	65,194	06 Jul 15:00		1	-	-	800.00	89.3	2.8	92.2	Dec-25	-	15.00	-	25.00

1 = Buy, 2 = Neutral, 3 = Sell, H = High Risk
ESPR = Expected Share Price Return, ETR = Expected Total Return, nc = no change
Source: Citi Research
^Catalyst Watch

Earnings Estimates

				Last Reported Year					Current Fiscal Year					Next Fiscal Year				
Company Name	Ticker	Last Rpt Year	Currency	1Q	2Q	3Q	4Q	FY0	1Q	2Q	3Q	4Q	FY1	1Q	2Q	3Q	4Q	FY2
Advanced Energy Solution	6781.TW	Dec-25	NT$	9.70	9.66	9.35	9.49	38.20	10.64	11.41	12.12	12.19	46.35	12.79	14.64	16.73	17.19	61.35
Old		Dec-24	NT$	5.41	5.22	6.27	8.49	25.39	9.70	9.66	10.71	9.99	40.06	8.89	11.76	15.75	15.49	51.89
Dynapack International	3211.TWO	Dec-25	NT$	1.07	3.89	1.56	2.53	9.05	2.05	2.37	4.19	6.39	15.00	3.85	3.82	6.78	10.55	25.00

Source: Citi Research

Contents

Figure 1. Valuation Comp of BBU Supply Chain

				Target	Price	Mkt-Cap	3M ADT	P/E (x)			EV/EBITDA (x)			P/B (x)			Dividend yield (%)			25- 27E 2yr EPS	ROE		
Company	RIC	Rating*	Curr	Price	6-Jul	US$M	US$M	FY26E	FY27E	FY28E	FY26E	FY27E	FY28E	FY26E	FY27E	FY28E	FY26E	FY27E	FY28E	CAGR (%)	FY26E	FY27E	FY28E
Taiwan																							
Dynapack	3211.TWO	1	TWD	800.0	422.5	2,041.1	116.9	28.2	16.9	11.3	19.2	11.7	7.9	7.3	6.7	6.0	2.8	4.7	7.1	66.3	24%	41%	56%
AES-KY	6781.TW	1	TWD	1,680.0	1,250.0	3,342.8	61.1	27.0	20.4	16.0	18.4	13.6	10.6	5.2	4.5	3.8	1.8	2.4	3.1	26.7	21%	24%	26%
STL	4931.TWO	NR	TWD	NA	261.0	535.8	72.2	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Sysgration	5309.TWO	NR	TWD	NA	68.9	496.9	18.4	53.0	20.4	na	na	na	na	7.4	5.7	na	0.9	1.7	na	72.8	9%	26%	na
Simplo	6121.TWO	1	TWD	480.0	467.5	2,707.3	12.0	14.6	12.3	na	4.5	3.6	na	2.4	2.2	na	4.9	5.8	na	16.2	17%	19%	na
Celxpert	3323.TWO	NR	TWD	NA	37.6	117.0	2.1	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Delta	2308.TW	1	TWD	2,480.0	1,995.0	162,239.7	849.2	50.9	32.3	19.6	26.7	17.8	10.9	13.3	9.7	6.7	1.0	1.6	2.6	63.3	28%	35%	40%
Lite-On	2301.TW	NR	TWD	NA	224.0	16,242.7	229.6	25.9	18.7	14.9	16.2	11.5	9.8	5.2	4.7	4.6	2.9	3.8	4.8	34.6	21%	27%	31%
AcBel	6282.TW	NR	TWD	NA	59.8	1,602.7	74.7	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Voltronic	6409.TW	NR	TWD	NA	1,290.0	3,564.3	34.5	38.8	30.9	25.6	26.0	22.1	18.7	12.0	10.7	9.9	2.4	2.5	2.8	2.6	31%	36%	41%
Chicony	6412.TW	NR	TWD	NA	92.0	1,154.3	9.7	16.3	13.9	na	7.9	6.2	na	2.2	2.4	na	4.5	5.5	na	13.0	14%	19%	na
Sub-Average								**31.8**	**20.7**	**17.5**	**17.0**	**12.3**	**11.6**	**6.9**	**5.8**	**6.2**	**2.7**	**3.5**	**4.1**	**36.9**	**21%**	**28%**	**39%**
Korea & Japan																							
Panasonic	6752.T	1	JPY	5,100.0	4,557.0	65,932.3	272.7	65.5	23.3	18.5	17.9	11.1	9.3	2.0	1.9	1.8	0.9	1.2	1.5	11.7	3%	9%	10%
Murata	6981.T	1	JPY	15,000.0	10,250.0	115,618.9	1,175.3	80.7	53.8	37.8	38.6	28.9	21.1	6.9	6.4	5.7	0.6	0.7	0.8	21.8	9%	12%	16%
Samsung SDI	006400.KS	1	KRW	900,000.0	451,500.0	23,791.5	294.5	161.9	21.5	16.4	29.5	9.3	8.2	1.4	1.4	1.3	0.2	0.2	0.2	na	1%	6%	8%
LG Energy	373220.KS	1	KRW	565,000.0	354,500.0	54,242.5	142.6	335.8	38.1	16.6	18.9	11.6	7.5	3.8	3.4	2.9	na	na	na	na	1%	9%	19%
Sub-Average								**160.9**	**34.2**	**22.3**	**26.2**	**15.2**	**11.5**	**3.5**	**3.3**	**2.9**	**0.6**	**0.7**	**0.8**	**16.8**	**4%**	**9%**	**13%**
China																							
Kehua	002335.SZ	NR	CNY	NA	37.9	4,188.7	263.5	38.0	27.9	22.4	20.2	16.4	14.5	3.7	3.4	3.1	1.3	1.8	3.0	56.0	11%	15%	17%
KSTAR	002518.SZ	NR	CNY	NA	47.5	4,081.2	120.9	30.4	21.6	16.7	22.1	16.2	12.4	5.0	4.3	3.5	1.3	1.9	2.7	44.2	17%	20%	22%
INVT	002334.SZ	NR	CNY	NA	7.1	858.1	53.1	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
CATL	300750.SZ	1	CNY	603.0	374.5	262,482.4	2,231.0	16.6	13.5	11.5	11.0	8.5	6.8	4.2	3.6	3.0	3.0	3.7	4.4	32.3	28%	29%	29%
BYD	002594.SZ	1	CNY	131.0	87.5	97,413.2	643.4	19.8	16.8	12.7	4.5	3.6	2.7	2.9	2.6	2.3	na	na	na	21.0	15%	16%	19%
EVE Energy	300014.SZ	1	CNY	87.9	59.4	19,060.9	747.5	14.8	12.0	9.0	10.6	8.7	6.1	2.5	2.2	1.8	1.7	2.1	2.7	57.8	18%	20%	22%
Sunwoda	300207.SZ	NR	CNY	NA	18.2	4,964.4	253.2	13.9	9.5	7.4	6.9	4.9	3.5	1.3	1.1	1.0	1.6	2.4	3.0	83.3	9%	12%	14%
Sub-Average								**22.2**	**16.9**	**13.3**	**12.6**	**9.7**	**7.7**	**3.3**	**2.9**	**2.5**	**1.8**	**2.4**	**3.1**	**49.1**	**16%**	**19%**	**20%**
Global																							
Vertiv	VRT.N	1	USD	414.0	318.5	122,327.1	461.0	50.2	36.6	28.6	36.8	25.6	19.6	20.2	13.2	8.9	na	na	na	53.4	45%	42%	38%
Flextronic	FLEX.N	NR	USD	NA	138.6	50,799.9	9.6	42.0	31.2	20.1	23.1	18.2	12.4	9.9	9.0	6.5	0.0	0.0	0.0	25.3	25%	31%	38%
ABB	ABBN.S	2	CHF	85.0	87.1	197,668.2	253.6	33.5	30.7	28.1	24.8	20.8	18.9	9.8	8.4	7.3	1.1	1.1	1.2	14.2	43%	29%	27%
Siemens Energy	ENR1n.DE	2	EUR	185.0	170.4	167,849.8	507.8	38.1	26.0	19.3	22.1	15.5	11.9	14.1	12.2	9.2	1.2	1.7	2.3	96.2	35%	50%	54%
Schneider Electric	SCHN.PA	1	EUR	340.0	278.4	183,718.3	308.4	26.6	23.3	20.6	18.4	16.2	14.1	5.9	5.2	4.6	1.6	1.7	1.9	21.9	21%	22%	23%
Eaton	ETN.N	1	USD	471.0	413.4	160,531.0	274.1	31.1	27.2	23.8	22.6	20.2	18.2	7.3	6.8	6.1	1.0	1.1	1.1	15.5	21%	24%	25%
Emerson Electric	EMR.N	1	USD	174.0	141.6	79,287.8	118.7	21.8	19.8	17.9	16.6	14.9	13.6	21.6	14.0	11.9	1.6	1.6	1.6	15.8	23%	66%	56%
Sub-Average								**34.8**	**27.8**	**22.6**	**23.5**	**18.8**	**15.5**	**12.7**	**9.8**	**7.8**	**1.1**	**1.2**	**1.3**	**34.6**	**30%**	**38%**	**37%**
Average								**65.5**	**26.3**	**19.8**	**21.9**	**15.0**	**12.2**	**6.9**	**5.7**	**5.0**	**1.5**	**1.9**	**2.2**	**40.8**	**18%**	**23%**	**27%**

*Note: 1=Buy, 2=Neutral, 3=Sell, H=High Risk

Source: Powered by DataCentral, Citi Research estimates and I/B/E/S estimates for Not-Rated (NR) Companies

Source: Thomson Reuters, Citi Research, Citi Research Estimates

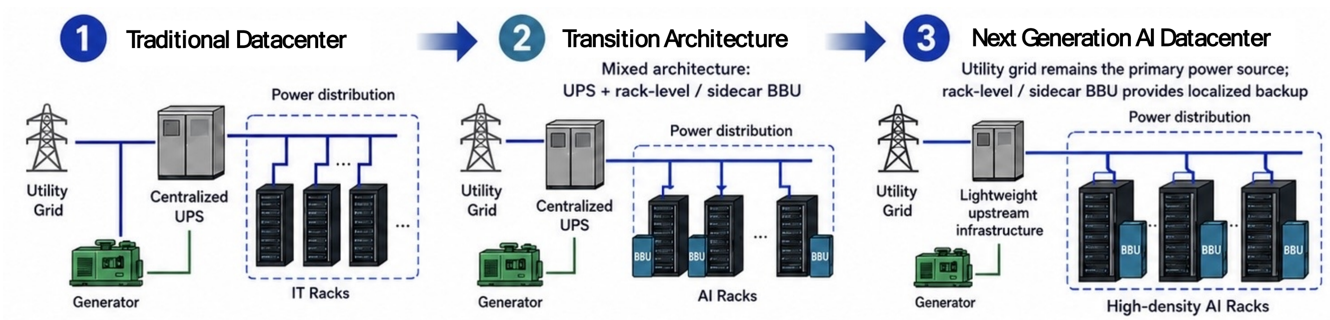
Executive Summary

AI Power Architecture Is Evolving, Making BBU An Increasingly Important Part of Next Gen AIDC

We believe AI infrastructure is entering a new power architecture cycle as rack power density continues to increase. Historically, datacenters relied on centralized UPS systems to provide backup power at the facility level. However, the transition toward rack-scale AI systems such as GB200/300 NVL72, together with the adoption of OCP ORv3 architectures, is moving backup power closer to the load through rack-level or sidecar BBUs.

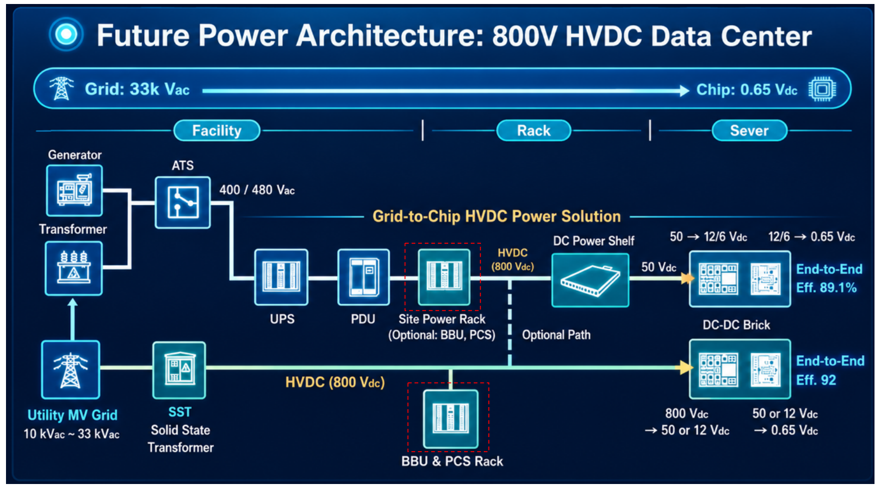
Compared with centralized UPS, localized battery backup offers faster ride-through capability, less power conversion losses and greater deployment flexibility. Looking ahead, we believe the commercialization of HVDC power architecture would further strengthen BBU's strategic importance, as battery backup power becomes increasingly integrated into rack-level power delivery. As AI rack power moves from today's 100-150kW toward several hundred kW in future platforms, we believe BBU is evolving from an optional component into a core element of AI power infrastructure.

Figure 2. Increasing Adoption of BBU in AIDC



Source: Citi Research

Figure 3. HVDC Power Architecture



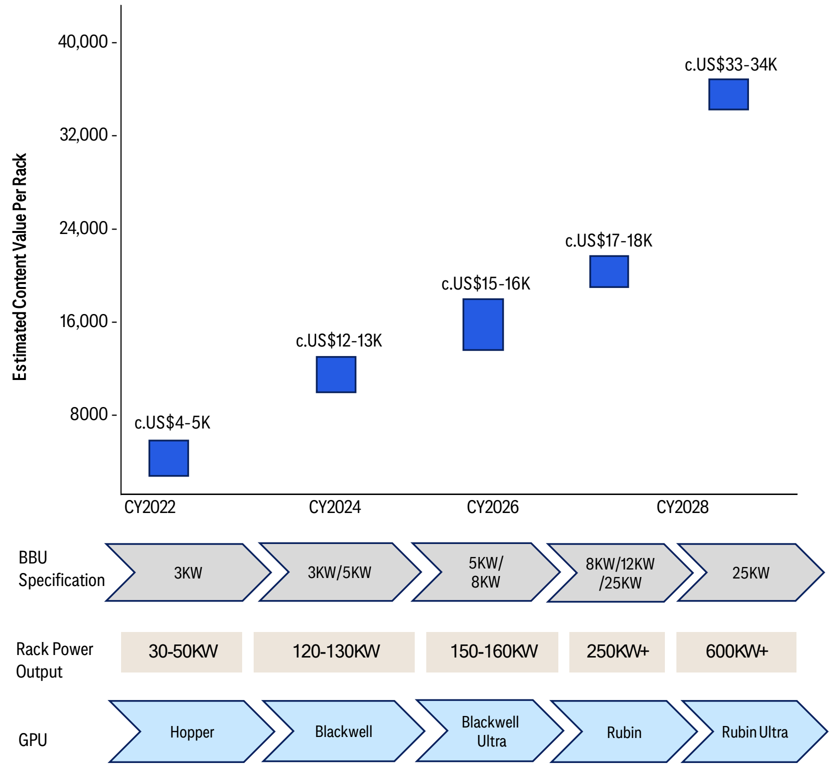
Source: Delta

We Expect BBU Content Value and Penetration to Rise Meaningfully

We believe the BBU market benefits from two growth drivers – higher content value per rack and broader industry adoption. Based on our bottom-up framework, we estimate BBU content value increases from c.US$15-16K per GB300 rack today to US$17-18K for Rubin, and could exceed US$33K under Rubin Ultra as higher-power battery systems become necessary.

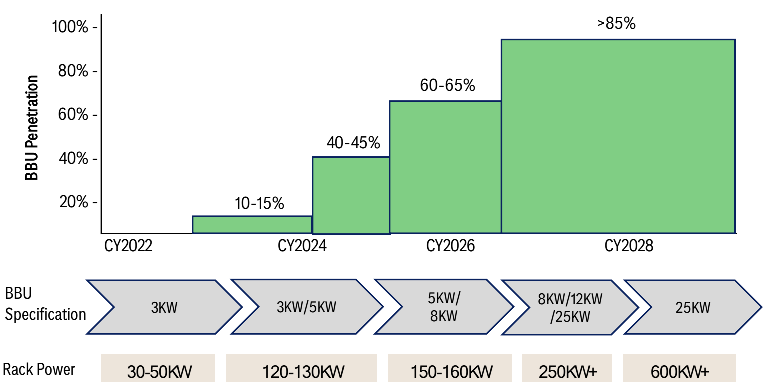
We also estimate BBU penetration in AI racks to rise from 40-45% in 2025 to >85% in 2027E, supported by increasing rack power density, broader adoption of rack-scale architectures, and the migration toward HVDC power distribution. We believe this combination of rising content value and penetration creates a multi-year structural growth opportunity for the BBU ecosystem.

Figure 4. Estimated Content Value Per Rack by Generation



Source: Citi Research, Citi Research Estimates

Figure 5. BBU Penetration Based on Our Estimates



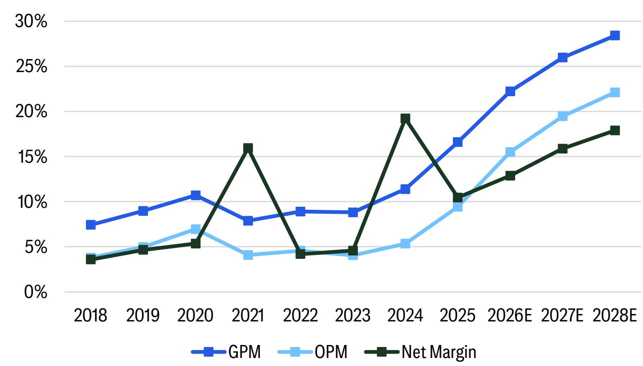
Source: Citi Research, Citi Research Estimates

Initiate Dynapack (3211.TWO) at Buy with TP of NT$800

We initiate coverage of Dynapack with a Buy rating and a TP of NT$800, as we view it as one of the most direct beneficiaries of the structural expansion in the BBU market. We expect the company to benefit from accelerating BBU adoption, rising content value and improving product mix, supported by its expertise in battery pack manufacturing, and close partnerships with leading PSU suppliers. We forecast 34% sales CAGR and 60% earnings CAGR over 2025-2028E, driven by rapid growth in non-IT BBU products and continued margin expansion.

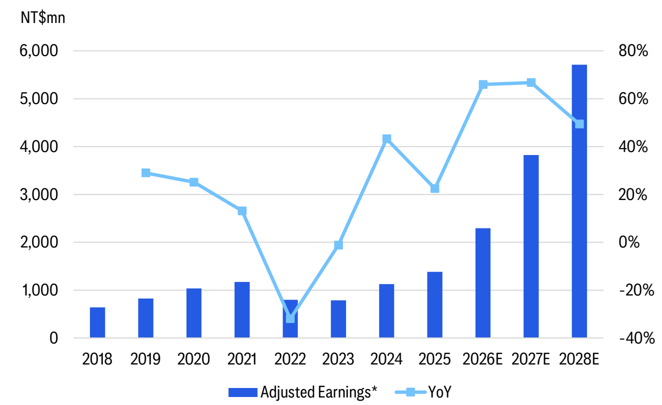
Our target price is based on 32x 2027E P/E, which we assign a 0.5x PEG to our 66% earnings CAGR in 2025-2027E, benchmarked to the 2027E PEG of Delta, its major PSU partner. We value Dynapack based on 2027E target P/E as we think 2027E would better reflect Dynapack's earnings power following capacity expansion and increasing exposure to higher-value BBU products.

Figure 6. Earnings Estimate vs. BBG



Source: Company Reports, Citi Research, Citi Research Estimates

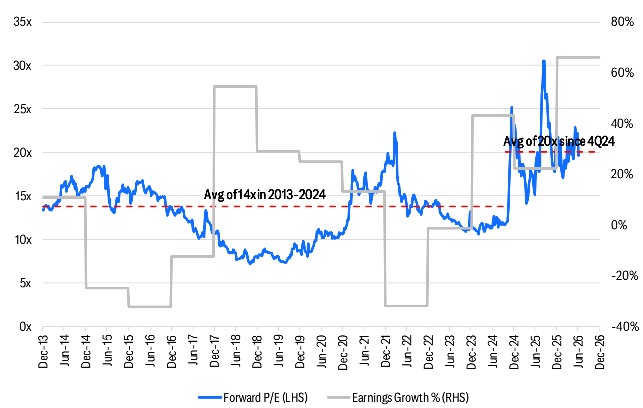
Figure 7. Dynapack: Earnings and YoY



*Adjusted earnings exclude non-operating gains from real estate disposal in 2021 and 2024.

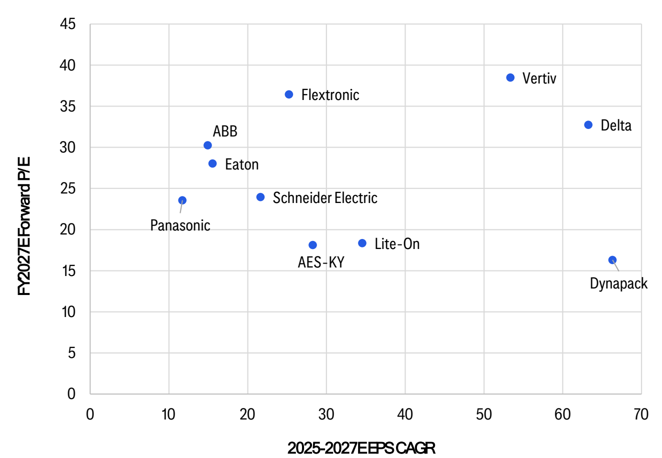
Source: Company Reports, Citi Research, Citi Research Estimates

Figure 8. Dynapack: Forward P/E vs. Earnings Growth



Source: Thomson Reuters, Citi Research, Citi Research Estimates

Figure 9. Peer Comp: Forward P/E vs. Earnings CAGR



Source: Thomson Reuters, Citi Research, Citi Research Estimates

Why We Prefer Dynapack over AES

While AES remains the dominant BBU supplier given its scale, customer relationships, and technology leadership, we believe Dynapack offers a more attractive risk-reward profile at the current stage of the AI infrastructure investment cycle, as its earnings remain in the early phase of a multi-year growth and margin expansion story.

We forecast 34% sales CAGR over 2025-2028E for Dynapack vs. AES's 24% sales CAGR, driven by accelerating BBU shipments and higher power BBU product ramp-ups; we estimate 60% earnings CAGR over 2025-2028E for Dynapack vs. AES's 27% driven by product mix improvement and stronger op leverage.

Figure 10. Dynapack vs. AES

	AES 6781.TW	Dynapack 3211.TWO
Earnings (NT$mn) in 2025	3,263	1,382
Group Sales (NT$mn) in 2025	16,001	13,218
BBU Sales (NT$mn)	10,798	4,626
BBU Sales %	*67%*	*35%*
GPM (2025/2026E/2027E)	35.9%/ 36.3%/ 36.9%	16.6%/ 22.2%/ 26.0%
OPM (2025/2026E/2027E)	24.2%/ 24.5%/ 25.8%	9.4%/ 15.5%/ 19.5%
NM (2025/2026E/2027E)	20.4%/ 20.9%/ 21.6%	10.5%/ 12.9%/ 15.9%
Sales CAGR in 2025-2028E	24%	34%
Earnings CAGR in 2025-2028E	27%	60%
Forward P/E on our 2027E EPS	20.0x	16.0x
Business Model	Direct engagement with CSPs Partnership with PSUs	Partnership with PSUs
Major CSP Customers	AWS	AWS, Meta
BBU Products in 2026	3-5kW mostly	3-5kW mostly, 8 & 12kW in 4Q26E
HVDC BBU Schedule	1H27	1H27
Capacity Expansion	China, Vietnam	Taiwan, Thailand

Source: Citi Research, Citi Research Estimates

Dynapack – Our 26E/27E EPS Estimates Are 17%/21% Higher Than BBG

Our earnings estimates for Dynapack are 17%/21% higher than BBG consensus for 2026E/2027E as we see stronger sales upside to 2H26E and 2027E reflecting the 8kW & 12kW BBU product ramp starting from 4Q26E together with the sustained strong demand for existing 3 kW & 5kW BBU products.

Figure 11. Dynapack: Our Earnings Estimates vs. BBG

	2026E			2027E		
NT$ mn	Citi	BBG	Chg	Citi	BBG	Chg
Revenue	17,803	16,405	*9%*	24,072	21,543	*12%*
Gross profit	3,956	3,477	*14%*	6,250	5,232	*19%*
Operating profit	2,759	2,390	*15%*	4,685	3,822	*23%*
Pre-tax profit	2,824	2,493	*13%*	4,720	4,021	*17%*
Net profit	2,293	1,985	*15%*	3,822	3,209	*19%*
Basic EPS (NT$)	15.00	12.84	*17%*	25.00	20.74	*21%*
Ratio						
Gross margin (%)	22.2	21.2	*1.0*	26.0	24.3	*1.7*
OPEX to Sales ratio (%)	(6.7)	(6.6)	*-0.1*	(6.5)	(6.5)	*0.0*
Operating margin (%)	15.5	14.6	*0.9*	19.5	17.7	*1.7*
Net margin (%)	12.9	12.1	*0.8*	15.9	14.9	*1.0*

Source: Citi Research, Citi Research Estimates, Bloomberg

BBU: Powering Next Gen AI Racks

From Centralized UPS to Distributed Rack-Level Backup

BBU, short for battery backup unit, is a rack-level or system-level energy storage module designed to provide short-duration backup power when grid/UPS (undisrupted power supply) is interrupted, unstable or experiencing voltage dips.

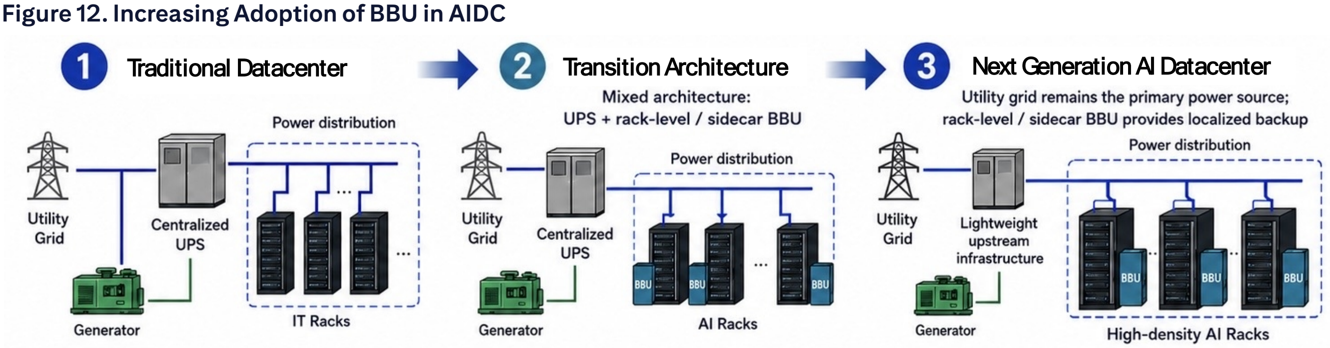
In traditional datacenters, backup power is mostly handled at the facility level through centralized UPS systems and generators; however, as datacenters move toward higher rack power density, the limitation of centralized UPS – including space requirements, power conversion losses, and low flexibility are driving a gradual shift toward a mixed architecture combining UPS and rack-level or sidecar BBU.

As AI racks become much more power-dense, power stability becomes increasingly critical. A short power interruption could disrupt high-value GPU workloads, so backup power needs to sit closer to the rack. This thus makes BBU an important component in next-generation AI datacenters, helping ensure stable and continuous power delivery.

Its value is not necessarily to run the rack for hours, but to bridge short outrages, ride through grid fluctuations, and to protect the rack while upstream UPS, generator, or power-management systems respond.

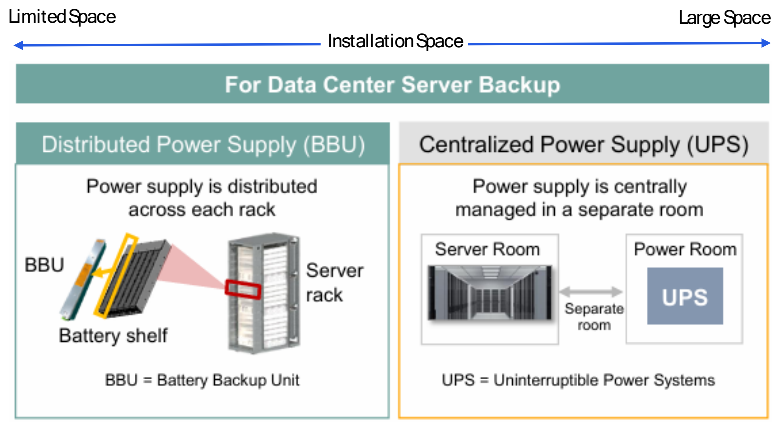
The BBU content value should scale with AI rack power density – the more power-hungry the rack becomes, the more important localized power backup, and energy management capability become, making BBU a structurally more important part of next generation AIDC infrastructure.

Figure 12. Increasing Adoption of BBU in AIDC



Source: Citi Research

Figure 13. BBU Is More Ideal for Close-to-Load Backup Power Support

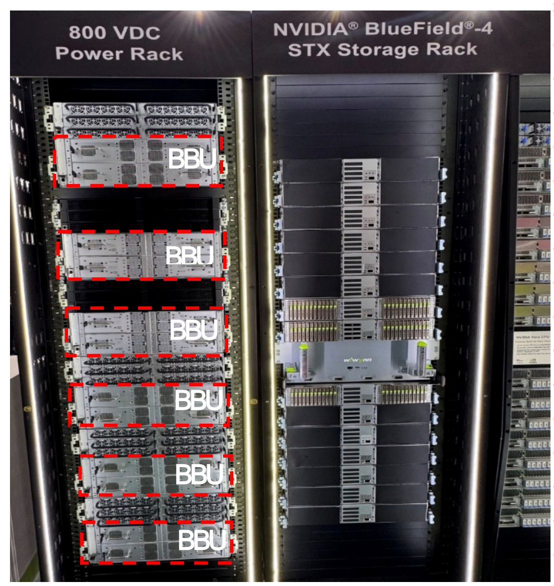


Source: Panasonic, Citi Research

Figure 14. 3kW BBU

Source: Delta

Figure 15. BBU in A Power Rack



Source: Citi Research

Historically, datacenters have relied heavily on centralized UPS as the main backup power system during outages. However, as AI datacenters move toward higher rack power density, the limitations of centralized UPS – including space requirements, power conversion losses, and lower flexibility are driving a gradual shift toward a mixed architecture combining UPS and rack-level or sidecar BBU. By placing backup power closer to the load – either in-rack or in a sidecar/power rack – BBU can provide short-duration ride-through power with lower distribution complexity and better efficiency.

Over time, BBU penetration could increase as backup power becomes more distributed. That said, we believe UPS is unlikely to disappear entirely, as it will still be needed to protect upstream power infrastructure, cooling systems, networking and other non-rack critical loads.

Figure 16. BBU vs. UPS Comparison

	BBU (Battery Backup Unit)	UPS (Uninterruptible Power Supply)
Typical Architecture	Distributed backup power, usually deployed at rack level, in-rack, power rack, or sidecar	Centralized backup power, usually deployed at facility level
Battery Type	Lithium-ion batteries	Lead-acid batteries
Weight	Lighter	Heavier
Expected Life	5-10 years	3-5 years
Physical Footprint	Smaller and more modular	Larger; require dedicated space for UPS cabinets
Power Path	Directly support the DC bus or rack-level power path	Grid AC -> UPS conversion -> Facility distribution -> rack power
Conversion Efficiency	Higher, as power conversion stages are less (DC-based)	Lower, as multiple conversion and distribution stages
Response Time	Very fast; suitable for short-duration ride-through at rack level	Fast enough for facility level backup, but less localized
Backup Duration	Short duration, typically several mins	Longer duration, typically several mins to tens of mins
Role in AI Datacenters	Increasingly important as AI racks move toward higher power density and distributed DC backup	Still needed, but likely shifts from being the only backup layer to part of a mixed UPS+BBU architecture

Source: Citi Research

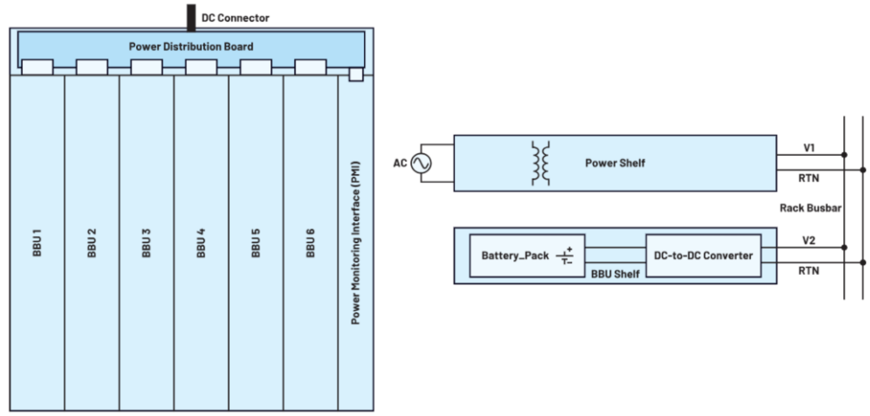
Rack-Scale Architectures Are Driving Broader BBU Adoption

BBU is not a formally mandatory component in every GB200/GB300 deployment based on public NVIDIA specifications. However, given the rack-scale power architecture of NVL72 systems and the growing adoption of OCP ORv3 (short for "Open Compute Project Open Rack Standard v3") power shelves and BBU shelves, we believe BBU is increasingly becoming a standard component for high-density AI racks.

In NVIDIA'S NVL architecture, GB200/GB300 NVL72 is designed as a rack-scale system rather than a server-level architecture. This means power delivery, cooling and backup power need to be considered at the rack level, not merely at the individual server level.

This is also consistent with the direction of OCP ORv3, an open-source datacenter rack architecture. Under the OCP ORv3 BBU specification, the BBU is designed to fit into a BBU shelf that forms part of the rack, supplying DC power to system loads during power outages. See the original article for the OCP ORV3 BBU Reference Design.

Figure 17. BBU Shelf Configuration in An OCP ORV3 Architecture



Source: Analog Devices

How Would HVDC Architecture Change The Landscape of BBU?

HVDC is emerging as the next-generation AIDC power architecture because low-voltage DC systems are reaching practical limits as AI rack power density rises. At 48V/54V, higher rack power requires much higher current, leading to thinker copper busbars, heavier cables, greater heat, higher power loss and less room for compute hardware. According to Ohm's Law (Power (P) = Voltage (V) x Current (I)), by distributing power at higher voltage, such as 800VDC, HVDC lowers current for the same power load, improving efficiency, reducing copper usage and cables, and lowering thermal pressure. It enables more centralized modular power designs, making it better suited for increasing power-hungry AI racks. Instead of being installed directly inside the IT rack, backup power could move into a dedicated power rack or sidecar (i.e. a centralized HVDC power cabinet) so as to free up more space for GPUs and other IT hardware.

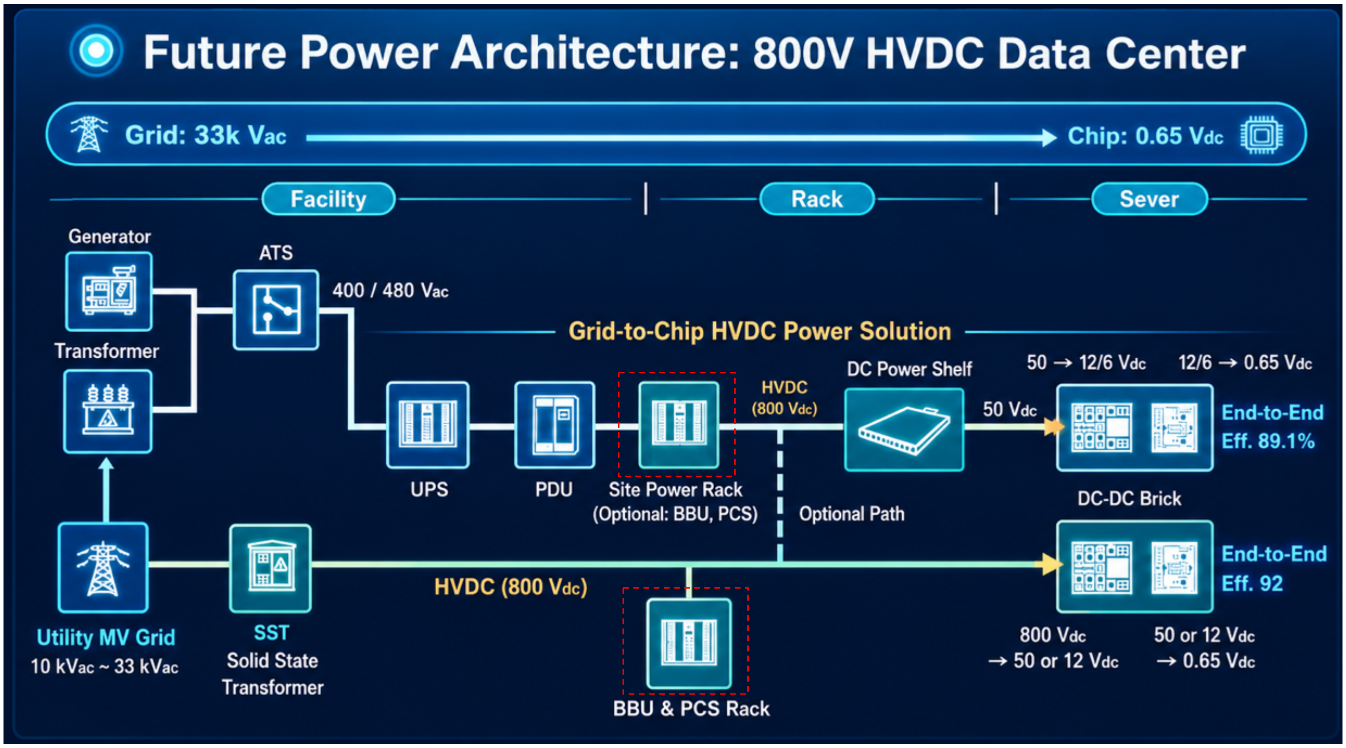
Under 800VDC architecture, BBU becomes part of a more complex high-voltage power delivery system. It needs to support higher voltage, higher discharge power, stricter safety protection, better thermal design, and energy management controllers etc. As a result, BMS (battery management system), high-voltage safety design and system level integration are becoming more important.

We believe HVDC would raise the value of BBU systems. As AI rack power rises from 100KW+ toward several hundred kW in future platforms, backup power requirements should also increase. Higher-power racks require greater battery capacity, higher discharge-rate capacity and centralized system that can support multiple racks.

This means BBU may evolve from a simple battery module into a higher-value subsystem that include battery modules, DC/DC conversion, protection circuits and thermal management etc.

To conclude, we believe the shift toward HVDC architecture would increase BBU content value as it makes backup power more technically demanding (higher voltage, higher discharge power, stricter safety protection, and tighter integration with the overall power system) and potentially more valuable as AI racks become increasingly power-dense.

Figure 18. HVDC Power Architecture



Source: Detla

A Closer Look at BBU Supply Chain

BBU Supply Chain

The BBU supply chain can be divided into three layers – upstream battery cell suppliers, midstream BBU module makers, and downstream power system integrators.

Upstream layer is the cell suppliers who provide the core battery cells, the building blocks of the BBU systems. In AI datacenters, where power interruption tolerance is extremely low, CSPs and system integrators tend to prioritize proven cell suppliers with strong safety track records, stable supply and consistent product quality.

- Key players include **Panasonic** (6752.T; Buy-rated, covered by Masahiro Shibano), **Murata** (6981.T; Buy-rated, covered by Takayuki Naito), **Samsung SDI** (006400.KS; Buy-rated, covered by Peter Lee), **LG Energy Solution** (373220.KS; Buy-rated; covered by Oscar Yee), and other battery cell suppliers. Panasonic also engages in making BBU packs and selling directly to CSPs.

Midstream layer consists of the BBU module makers. These companies purchase battery cells from battery cell suppliers and assemble them into battery backup modules that can be used at rack, sidecar or system level. Their value add is not limited to mechanical assembly but they are responsible for battery pack design, battery management system integration, thermal design, safety protection and communications with the rack-level power system. The key technical requirements include fast discharge response, high power density, cell balancing, fault detection and compliance with safety certification standards (such as UL9540A).

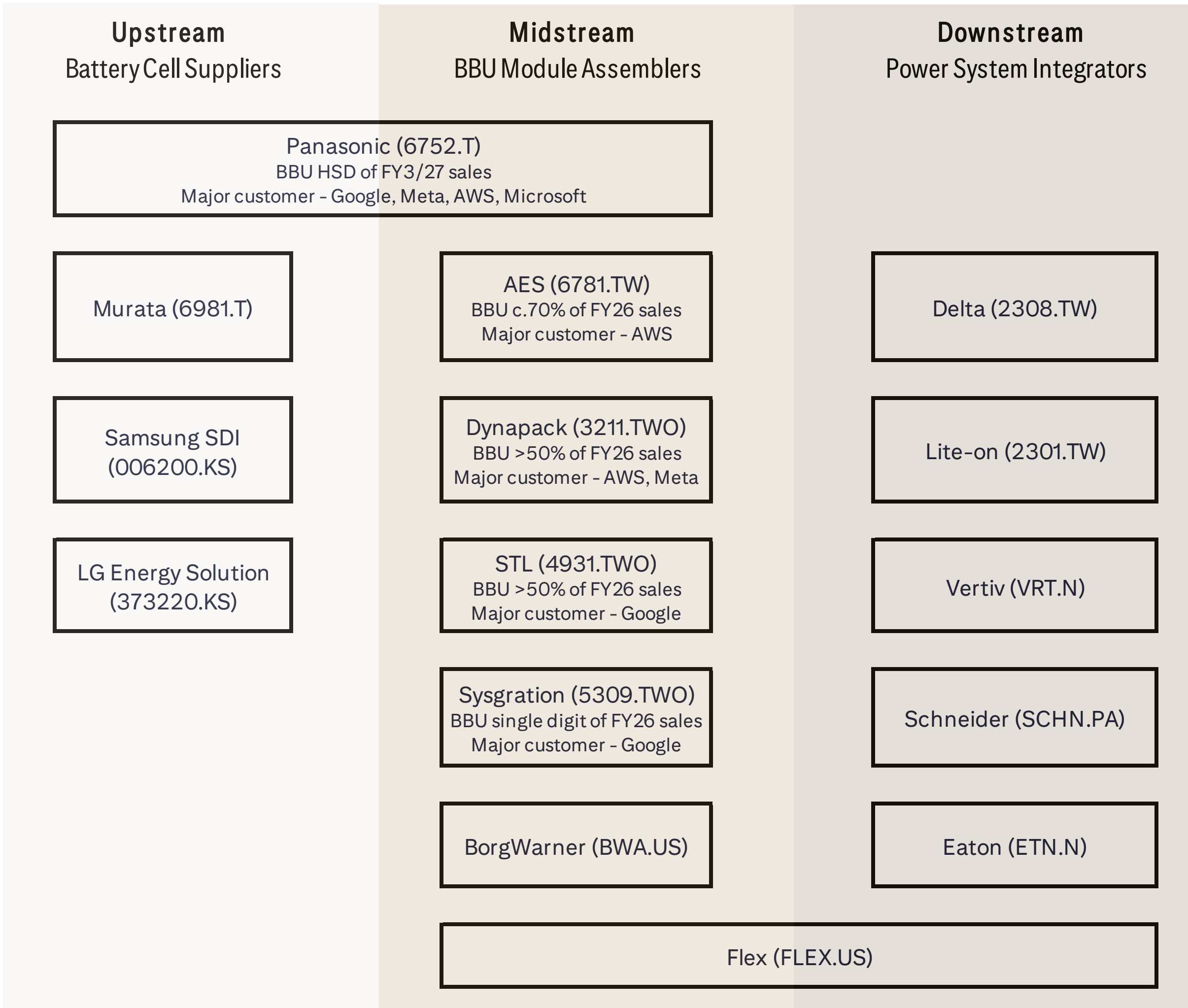
We believe as AI rack power density continues to rise, the role of BBU module makers have become more important because the BBU is increasingly tied to the overall power architecture rather than being a simple backup component.

- Key players include **AES** (6781.TW; Buy-rated), **Dynapack** (3211.TWO; Buy-rated), **STL** (4931.TWO; not covered), **Sysgration** (5309.TWO; not covered), **BorgWarner** (BWA.US; not covered), and **Flex** (FLEX.US; not covered). Player such as Flex also engage in downstream power system level integrations.

Downstream layer is mainly composed of PSU suppliers. These companies integrate BBU modules with broader rack-level power solutions, including power shelves, rectifiers, power distribution units etc. PSU integrators influence platform adoption and design-in opportunities. For BBU module makers, partnering with PSU suppliers can provide easier access to major AI server platforms and cloud customers.

- Key players include **Delta** (2308.TW; Buy-rated, covered by Laura Chen), **Lite-on** (2301.TW; not covered), **Vertiv** (VRT.N; Buy-rated, covered by Andrew Kaplowitz), **Flex, Schneider** (SCHN.PA; Buy-rated, covered by Martin Wilkie) and **Eaton** (ETN.N; Buy-rated, covered by Andrew Kaplowitz).

Figure 19. BBU Supply Chain at A Glance



Source: Citi Research

Two Business Models in the BBU Supply Chain

1st model – Direct engagement with CSPs (Panasonic, Flex, and AES)

BBU suppliers work closely with CSPs on system-level battery design, performance requirement, safety standards and rack-level integration. In this business model, BBU suppliers get involved earlier in the design cycle, helping CSPs customize the BBU architecture based on power density, backup time and thermal constraints etc. This creates a tighter relationship with the CSPs and likely higher customer stickiness.

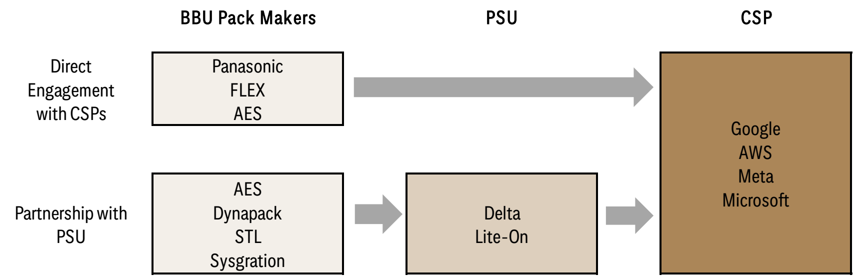
In this model, BBU suppliers can capture more strategic value because they work closer with the end customers and may have better visibility into next generation rack designs.

2nd model – Partnership with power supply unit ("PSU") providers (Dynapack, STL)

In this structure, the PSU suppliers (such as Delta and Liteon) play the role of system integrators, combining power shelves, control systems, power management software, and BBU modules into a more complete rack-level power solution. The BBU suppliers provide the battery module and battery management system, while the PSU providers handle broader integration with the rack or data center power architecture.

In this model, BBU suppliers can benefit from the PSU vendors' existing customer access, integration capability and scale.

Figure 20. Two Business Models in BBU Supply Chain



Source: Citi Research

BBU: Rising Content Value and Penetration As Power Density Further Accelerates

Rising Content Value As Power Density Further Rises

We estimate BBU content value in an AI rack by using a module-based approach. The calculation is based on three key assumptions: rack-level power requirement, BBU specification, and redundancy configuration (we assume 5+1 redundancy structure).

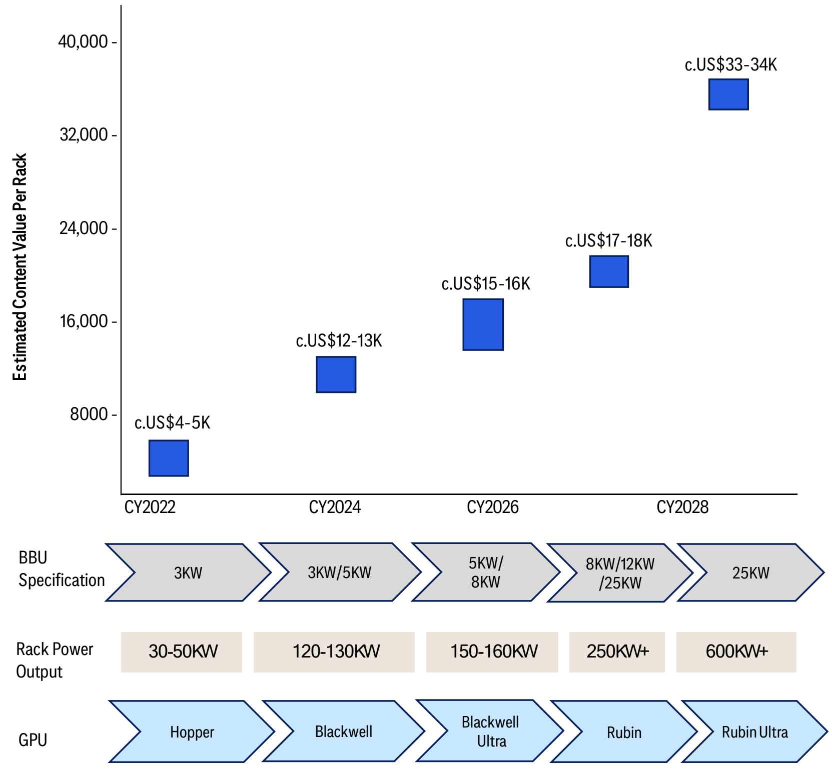
As an example of calculating BBU content value – assuming a 120KW AI rack and a 3KW BBU module, the rack would require at least 40 BBU modules (120KW/3KW) to support the rack's power load during a backup event and assuming the system requires 5+1 redundancy for the buffer i.e.. 5 BBU units to support the target load with 1 additional redundant unit included for fault tolerance. Thus, we estimate a 120KW AI rack would need ~48 BBU modules (40x6/5). Based on an estimated 3KW BBU pack ASP of c.US$270, this implies BBU content value of c.US$13K for a 120KW AI rack.

Based on this framework, we expect BBU content value to increase meaningfully as AI rack power density rises. We estimate BBU content value to be c.US$15-16K for current GB300 NVL72 rack which requires ~38 5KW BBU packs (assuming 5KW BBU ASP US$400), and US$17-18K for Rubin generation where rack power consumption is up to >250KW. See Figure 21. Estimated Content Value Per Rack by Generation.

For Rubin Ultra, rack power could reach 600KW, representing a step-change in AI rack power density. At this power level, lower-power BBU modules would become impractical due to the large number of modules required. We hence assume the adoption of 25KW BBU module for Rubin Ultra rack. Using a 25KW BBU ASP of c.US$1200 per pack, a 600KW rack would require c.29 BBU modules, implying BBU content value to be US$33-34K per rack.

Overall, we expect BBU content value per AI rack to increase from current US$15-16K in BlackWell generation to US$33-35K in Rubin Ultra, driven primarily by rising rack power density.

Figure 21. Estimated Content Value Per Rack by Generation



Source: Citi Research, Citi Research Estimates

Rising Penetration in BBU Adoption Driven by Higher Power Density

We estimate BBU penetration in AI racks would rise from 10-15% in 2023-2024 to 40-45% in 2025, 60-65% in 2026, >85% in 2027. This estimate is based on the evolution of AI rack architecture along with our industry checks, the transition from traditional server racks to rack-scale systems such as GB200/300 NVL72, and the growing adoption of OCP ORv3 power architecture.

- 2023-2024 (10-15% of penetration) early adoption stage

Most AI infrastructure deployed during this period was still based on H100/200-class system and more traditional data center power architecture. Backup power was generally handled at the facility level through centralized UPS systems rather than distributed at the rack level.

- 2025 (40-45% of penetration) rising with GB200 NVL72

The key change is GB200 NVL72 is a rack-scale system that integrates multiple compute trays, switch trays, liquid cooling, power shelves and high speed NVLink connectivity into a single rack-level platform, which changes the way power backup needs to be designed. As rack power moves toward 100KW+ range, BBU, which is more space saving, has less distribution losses and higher flexibility, becomes more ideal to support short-duration backup power closer to the IT load. We thus believe BBU adoption rate should start rising meaningfully in particular among hyperscalers who adopt OCP ORv3-style racks, pursuing higher power efficiency or want to reduce reliance on large centralized UPS systems.

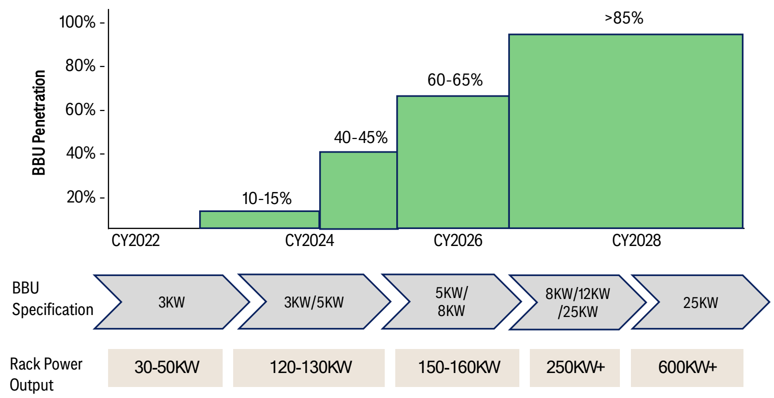
- 2026 (60-65% of penetration) broader adoption with GB200/300 and ORv3 architecture

Few drivers in this stage include 1) AI rack power density continues to rise. Higher rack power makes short-duration ride through protection more important. 2) OCP ORv3 defines a BBU shelf architecture, with BBU shelf connected to the rack-level DC bus. We believe large CSPs with strong in-house infrastructure teams would adopt BBU more aggressively.

- 2027 (>85%) BBU becomes a must for HVDC AI racks

We believe the transition toward HVDC power architecture could further accelerate BBU adoption. Under HVDC architecture, the datacenter increasingly distributes high-voltage DC power directly to the rack. Once the rack is operating on a DC backbone, it becomes more natural to connect battery-based backup power directly to the DC bus. Thie reduces the need for multiple ACDC and DCAC conversion stage and improves the efficiency of short-duration backup power delivery. We thus expect a growing share of high-density AI racks will adopt either in-rack BBU shelves or sidecar/power rack BBU.

Figure 22. BBU Penetration Based on Our Estimates



Source: Citi Research, Citi Research Estimates

Company Section

Dynapack International (3211.TWO)

Buy | TP NT$800.00 | Price NT$422.50 (06 Jul 26 15:00)

Beneficiary of strong AIDC BBU demand — We believe Dynapack is well positioned to capture rising BBU demand as AI server racks move to higher power density. As rack-level power consumption moves toward >100kW and future platforms require even higher power density, datacenters need faster and more localized backup power solutions. We expect BBU adoption to rise with OCP/HVDC power architecture evolution, while higher rack power should also drive higher BBU content value per rack. We forecast sales to rise 34% CAGR in 2025-2028E, boosted by strong non-IT sales +74% CAGR.

Margin expansion from rising non-IT mix — Dynapack's legacy IT battery business is mature and faces pricing pressure. We estimate IT battery pack GPM at only 5-10%. By contrast, BBU products require customized design, higher reliability standards, stricter safety validations and closer collaboration with PSU operators and CSPs. We estimate BBU GPM at 30-35%, materially above legacy IT products. As Dynapack shifts toward higher margin BBU products, we forecast GPM to expand from 16.6% in 2025 to 22.2% in 2026E, 26.0% in 2027E and 28.4% in 2028E. With robust GPM expansion and strong op leverage, we forecast Dynapack's earnings to rise 60% CAGR in 2025-2028E.

PSU partnerships broaden CSP exposure — We think Dynapack's partnership model with PSU operators is a key strategic advantage. PSU operators typically control power shelves, rack level power architecture and system level customer interface; whereas Dynapack focuses on the battery pack layer where it has strong knowhow in battery design, BMS management and customized manufacturing. By working with multiple PSU operators, Dynapack can indirectly access a broader CSP and AIDC customer base, reducing reliance on any single CSP or platform.

Initiate at Buy with TP NT$800 — We assign a 32x target P/E to our 2027E EPS of NT$25 to derive a target price of NT$800. We value Dynapack based on 2027E target P/E as we believe 2027E better reflects its earnings power after BBU capacity expansion. Our target P/E of 32x is based on our forecast EPS CAGR of 66% in 2025-2027E and a PEG of 0.5x, which we benchmark against Delta, its major PSU partner, as we expect Dynapack to grow alongside Delta.

Earnings Summary

Year to 31 Dec	Net Profit (NT$M)	Diluted EPS (NT$)	EPS growth (%)	P/E (x)	P/B (x)	ROE (%)	Yield (%)
2024A	2,673	17.59	236.1	23.1	5.8	28.0	3.1
2025A	1,382	9.05	-48.5	44.9	6.2	13.4	2.8
2026E	2,293	15.00	65.7	27.1	7.0	24.4	3.0
2027E	3,822	25.00	66.7	16.3	6.5	41.4	4.9
2028E	5,710	37.35	49.4	10.9	5.8	56.1	7.4

Source: Powered by dataCentral

Dynapack (3211.TWO): Our Investment Thesis

Investment positive #1 – riding on the strong demand of BBU from AIDC buildout, driving structural growth

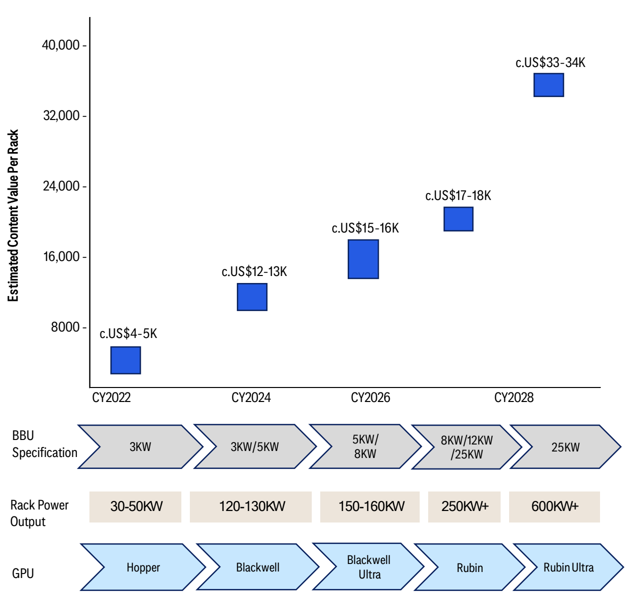
Dynapack has historically been a notebook and consumer electronic battery-pack supplier, but its product portfolio is increasingly expanding into non-IT applications such as BBU, UPS, ESS, and LEV battery packs. Among these, BBU is the most important structural growth opportunity for Dynapack, making up the majority of its non-IT sales. We estimate BBU sales to contribute 35% of Dynapack's group sales in 2025 and accelerate to 55% of group sales in 2026E.

We believe Dynapack is well positioned to benefit from rising BBU demand driven by AIDC infrastructure buildout. As AI server racks move from traditional low-power racks to high-density GPU racks, rack level consumption is increasing significantly.

This creates a greater need for localized backup power solutions that can provide immediate power support during grid instability, power transition, or short-duration outages. As indicated in the industry section, unlike traditional centralized UPS systems, BBU can be deployed closer to the server rack or power shelf, enabling faster responses, lower conversion loss, and better compatibility with high-density rack-scale power architectures.

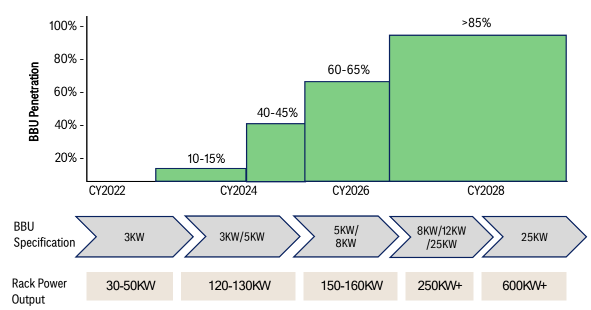
We expect when the rack power is moving towards >150KW levels, BBU is likely to become an increasingly important component in AI rack power architecture, as higher rack power density raises both the absolute amount of backup power required per rack and the fast load transients.

Figure 23. Estimated Content Value Per Rack by Generation



Source: Citi Research, Citi Research Estimates

Figure 24. BBU Penetration Based on Our Estimates



Source: Citi Research, Citi Research Estimates

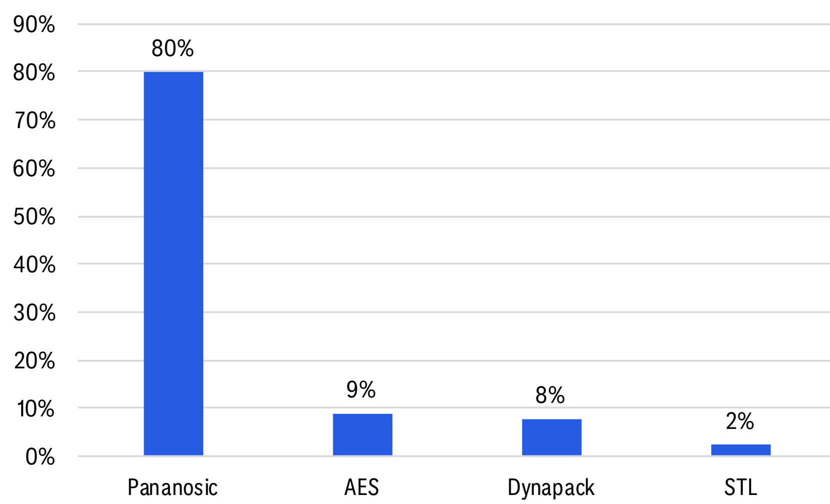
For Dynapack, BBU provides a meaningful growth opportunity beyond its mature consumer electronic battery-pack business. Dynapack has long-standing experience in lithium-ion battery pack design, battery management systems, safety certifications, and customized manufacturing.

We think Dynapack's BBU opportunity is not only a volume growth story but also a content value expansion story – as AI rack power rises, the required backup power per rack should increase, suggesting higher BBU content value per rack over time.

Furthermore, we've seen a clear trend that future AI power architecture would shift from centralized UPS toward more distributed BBU deployment at the shelf, rack, or DC busway level, which could structurally lift BBU penetration in AI datacenters.

We believe that as AI rack shipment continues to scale and BBU adoption rises with OCP/HVDC power architecture evolution, Dynapack is poised to benefit from both higher non-IT sales contribution and better product mix.

Figure 25. Market Share of BBU Supplier (FY2026E)



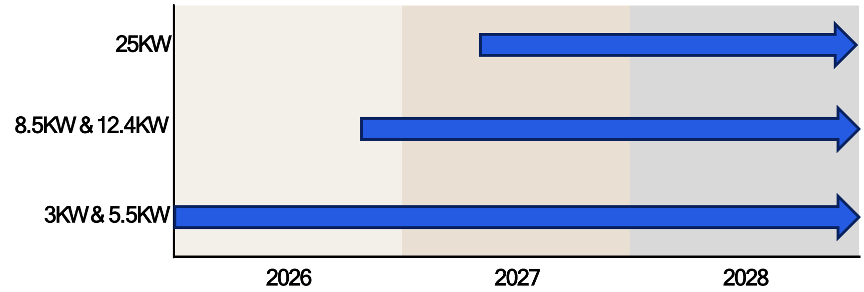
Note: Market share of Panasonic is based on Panasonic's investor presentation. AES, Dynapack and STL market share is based on our estimates.

Source: Panasonic, Citi Research, Citi Research Estimates

Per Dynapack, the majority of products selling to PSU operators are 3KW and 5.5KW BBU modules in 2026E and they expect to start selling small volume of higher KW products (8.5KW, 12.4KW) in 4Q26E. We expect the products for HVDC (25KW BBU) to begin mass production in 2027E, further fueling the topline growth, in our view.

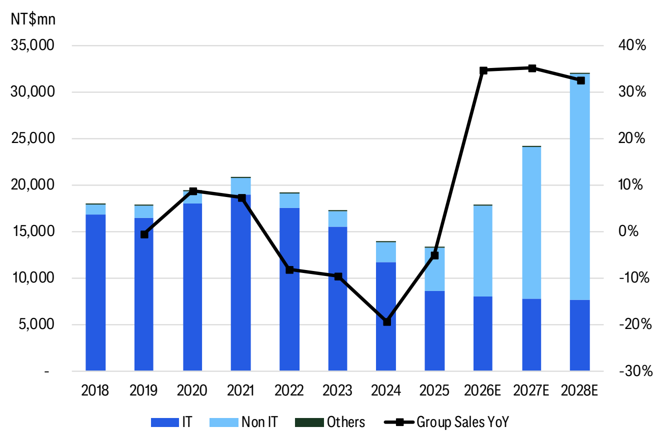
We estimate Dynapack's sales to rise by 34% CAGR in 2025-2028E, boosted by the ongoing ramp-up of higher power BBU products, rising rack power density leading to higher content value and penetration of BBU, and its share gains

Figure 26. Dynapack: BBU Products Pipeline



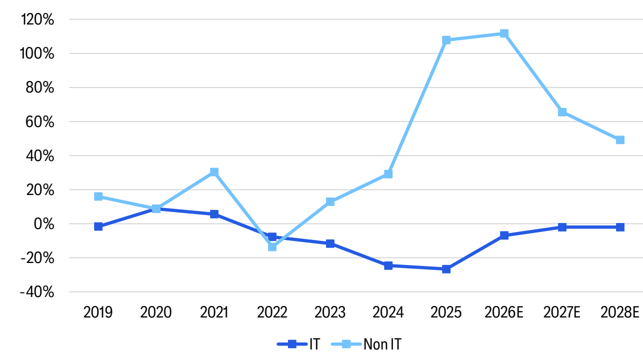
Source: Company Reports, Citi Research

Figure 27. Dynapack: Group Sales and YoY



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 28. Dynapack: IT Sales and Non-IT Sales YoY



Source: Company Reports, Citi Research, Citi Research Estimates

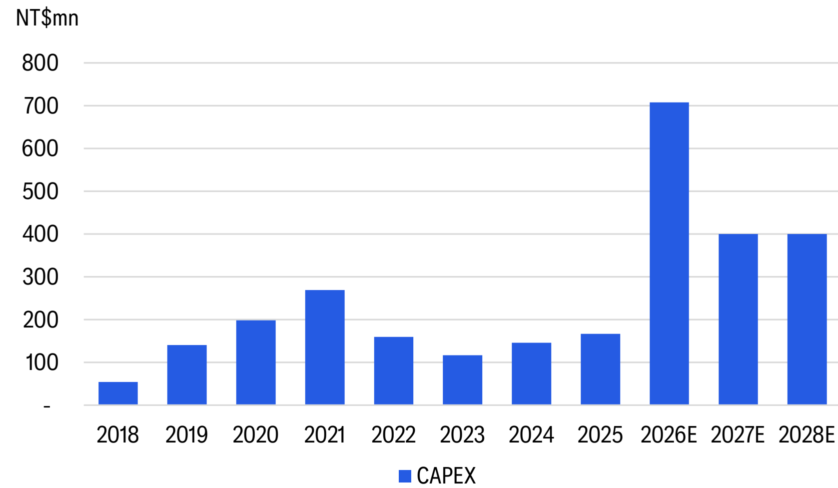
What Are Dynapack's Competitive Advantages vs. Other BBU suppliers?

1. **Strong battery-pack know-how –** it has a long operating history as a lithium-ion battery-pack maker, specializing in pack design, cell integration, battery management, safety validation, and customized manufacturing.

2. **Strong partnership with PSU operators –** unlike Panasonic or AES who rely mostly on direct engagement with a single CSP or a narrow set of end customers, working with PSU companies allows Dynapack to gain access to a broader set of CSPs.

3. **Faster capacity ramp-up to capture near-term strong BBU demand –** compared with other BBU suppliers that may need to squeeze new production lines into existing facilities or secure new land and construct new facilities, Dynapack appears to have more flexibility to expand capacity as they have self-owned facility space in Taiwan, which allows them to accelerate capacity addition. The mgmt. expects non-IT capacity to be 2x more by end-2026 vs. end-2025.

Figure 29. Dynapack: CAPEX Trend. Dynapack Expects CAPEX to be NT$600-800mn for 2026E



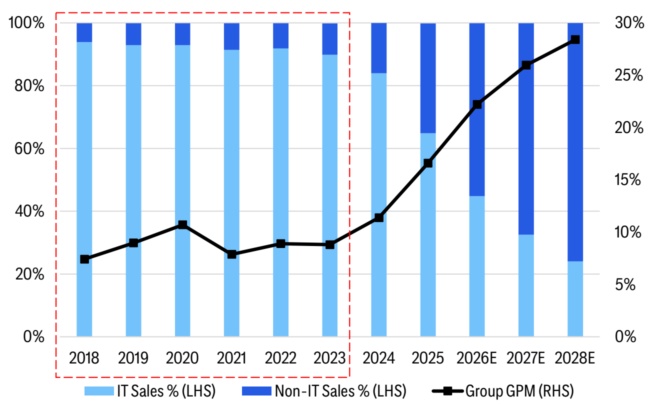
Source: Citi Research, Company Reports, Citi Research Estimates

Investment positive #2 – Intact margin expansion from rising non-IT sales

We expect Dynapack to enjoy intact margin expansion trajectory in the coming years, supported by rising contribution from non-IT products, in particular, BBU. The company's legacy IT battery pack business is mature with more intense pricing pressure from notebook and consumer electronics customers. As a result, we estimate GPM of IT battery pack to be only 5-10%, benchmarked with Dynapack's group GPM in 2016-2023 before BBU started becoming the key sales driver.

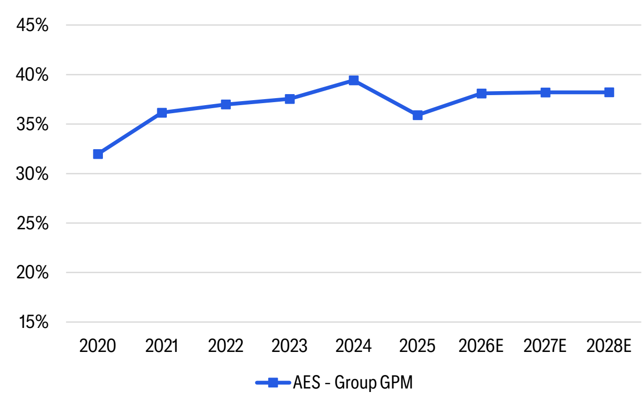
In contrast, BBU products are still in an early growth stage and require highly customized designs, higher reliability standards, stricter safety validation, and closer collaboration with PSU operators and CSPs. We estimate BBU GPM to be 30-35%, benchmarked with AES's GPM, materially higher than the legacy IT business. Unlike notebook battery packs, where the market is mature and customers have stronger bargaining power, we believe AIDC BBU is a higher spec product category with a higher entry barrier, supporting better pricing power.

Figure 30. Dynapack: Group GPM 5-10% Before BBU Sales Ramp-up



Source: Company Reports, Citi Research

Figure 31. AES: Group GPM 30-40%



Source: Company Reports, Citi Research

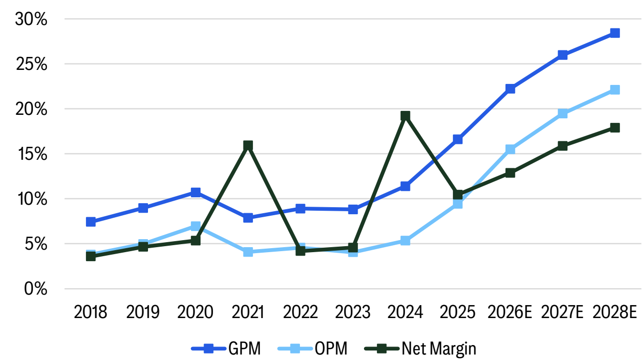
As the company shifts from a revenue mix dominated by low-margin IT business towards a higher share of BBU products carrying higher GPM, blended margin should expand meaningfully even before considering operating leverage.

We also believe higher-kW BBU products would carry higher GPM than lower power BBU modules as it increases product complexity and engineering content, allowing Dynapack to capture higher ASP and better margin.

We estimate Dynapack's GPM to reach 22.2% in 2026E, up from 2025's 16.6% and further accelerate to 26.0%/28.4% in 2027E/2028E.

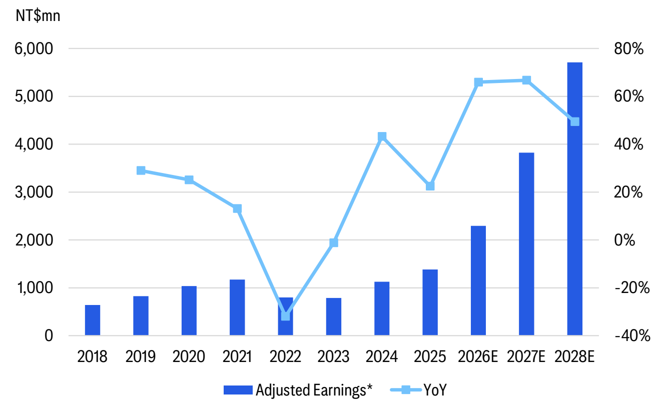
As BBU sales contribution rises, we believe Dynapack's earnings quality should improve through both faster top-line growth and higher profitability. We forecast its group earnings to grow 66% y/y in 2026E, 67% y/y in 2027E and 49% y/y in 2028E respectively.

Figure 32. Dynapack: Margins Trend



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 33. Dynapack: Earnings and YoY



*Adjusted earnings exclude non-operating gains from real estate disposal in 2021 and 2024.

Source: Company Reports, Citi Research, Citi Research Estimates

Investment positive #3 – Strong Partnership with PSU operators provides access to a broader CSP base

We believe Dynapack's partnership with PSU operators is a key strategic advantage in the AIDC BBU supply chain. Dynapack appears to be positioning itself as a specialized BBU battery pack partner to power supply companies. The model is strategically attractive because PSU operators typically control the power shelf, rack-level power architecture and system level customer interface, while Dynapack can focus on the battery pack where it has stronger know-how in Lithium-ion pack design, BMS, thermal management, safety validations and customized manufacturing.

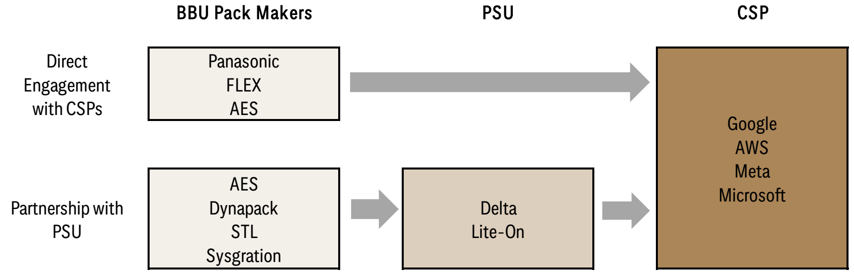
This partnership model allows Dynapack to gain access to a broader downstream customer base. Major PSU operators usually serve multiple CSPs, ODMs, and AI server programs. By working with more than one PSU customer, Dynapack can participate in multiple end-customer projects, creating a more balanced customer mix over time.

We believe this is especially important in the early stage of the AI BBU market, where rack power architecture is still evolving and customer specifications differ across different generations of architecture. A supplier engaged in a couple of PSU platforms should be better positioned to capture industry-wide BBU adoption than a vendor tied to only one CSP.

We also think PSU operators would have strong incentives to work with specialized BBU pack suppliers instead of fully internalizing the battery-packs as PSU vendors' core strength is power conversion, rectifiers, power shelves, rack-level distribution and system integration. In contrast, BBU pack manufacturing requires a different capability set, including cell matching, battery management, thermal protection, and safety certifications etc. Given the safety sensitivity of lithium-ion batteries inside datacenters, PSUs are likely to prefer qualified BBU partners that can reduce engineering burden and lower certification risks. Whereas for Dynapack, this creates a share gain opportunity as the company can benefit from the scale and customer access of PSU operators, growing with PSUs as BBU adoption rises across AI racks. This complementarity should make the relationship structurally more sustainable, in our view.

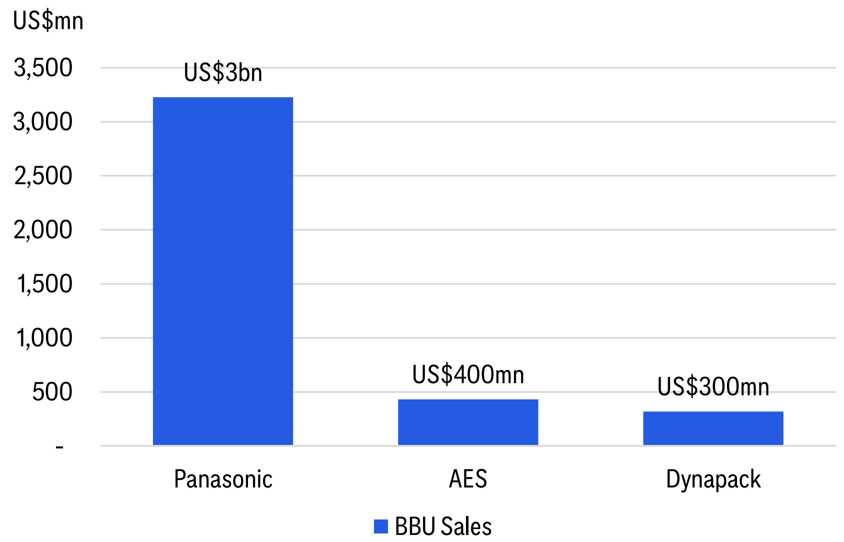
As BBU demand accelerates with higher AI rack power density, PSU operators will need suppliers that can provide both engineering customization and volume production. We believe Dynapack's long history in battery-pack manufacturing, customized BBU product development, and aggressive capacity expansion should strengthen its leading position as a preferred partner.

Figure 34. BBU Supply Chain



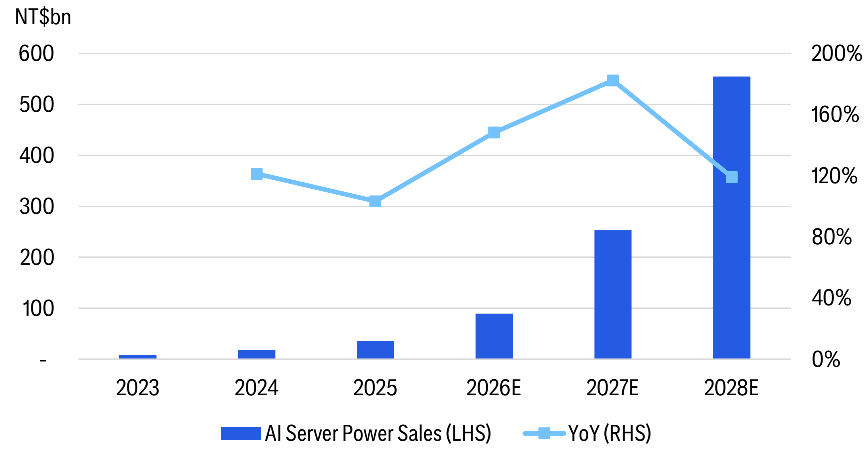
Source: Citi Research

Figure 35. BBU FY26 Sales Comparison – Panasonic Is 10x Larger Than Dynapack



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 36. Delta (2308.TW) AI Server Power Sales Estimates



Source: Citi Research, Citi Research Estimates

Would PSU Operators Fully Vertically Integrate into BBU Manufacturing and Compete with Specialized BBU Vendors?

We think the risk is relatively low as BBU requires a very different technical capability set from traditional power conversion. The core advantage of PSU vendors such as Delta and Lite-on lies in rectifiers, power conversion, rack/shelf-level power distribution, and most importantly, system integration. Whereas, BBU pack manufacturing requires deep know-how in lithium-ion cell selection/matching, pack design, BMS, thermal management, safety protection, and reliability validation.

We believe safety is one of the most important barriers – Li-on BBU products must meet strict safety and reliability requirements involving multiple dedicated testing and certification across battery safety standards. For example, UL 9540A, a fire-testing method evaluating thermal runaway behavior and fire propagation risk.

Therefore, PSU operators are more likely to retain control of the system architecture and customer interface, while collaborating with qualified BBU vendors such as Dynapack. This allows PSU operators to shorten development cycles, avoid heavy capex and learning curve costs and maintain focus on their higher-value power system integration role.

Dynapack (3211.TWO): Financial Analysis

Income Statement Analysis

Dynapack's revenue fell over 2022-2025 as weakness in its mature IT battery-pack business more than offset the still-early contribution from non-IT products. Net sales fell from NT$19.1bn in 2022 to NT$13.2bn in 2025, implying a 2022-2025 sales CAGR of -11.5%. This reflects soft notebook demand, pricing pressure in legacy IT battery packs and the fact that BBU/UPS/ESS revenue had not yet reached sufficient scale to offset the IT downturn.

Thanks to the strong BBU demand for AIDC applications, the group quarterly sales had turned to positive growth starting from 3Q25. We forecast revenue growth to accelerate meaningfully from 2026E, driven by the ongoing ramp-up of BBU products for AIDC, rising rack power density leading to higher penetration of BBU, and its share gains. We expect the legacy IT battery pack business to remain mature.

We estimate sales to grow 35% y/y in 2026E, followed by 35% y/y in 2027E and 33% y/y in 2028E, implying a 2025-2028E sales CAGR of 34%.

Figure 37. Dynapack: Our Sales Assumptions

Revenue Assumptions	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E
Sales									
IT	17,967	18,979	17,521	15,478	11,675	8,570	7,981	7,822	7,665
Non IT	1,354	1,765	1,526	1,723	2,226	4,626	9,797	16,223	24,207
Others	27	25	25	29	10	22	25	28	30
Total	**19,348**	**20,770**	**19,072**	**17,230**	**13,912**	**13,218**	**17,803**	**24,072**	**31,902**
YoY%									
IT	9%	6%	-8%	-12%	-25%	-27%	-7%	-2%	-2%
Non IT	9%	30%	-14%	13%	29%	108%	112%	66%	49%
Others									
Total	**9%**	**7%**	**-8%**	**-10%**	**-19%**	**-5%**	**35%**	**35%**	**33%**
As % of Sales									
IT	93%	91%	92%	90%	84%	65%	45%	32%	24%
Non IT	7%	9%	8%	10%	16%	35%	55%	67%	76%
Others	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Company Reports, Citi Research, Citi Research Estimates

Margin expansion is the key financial upside in our forecasts. Dynapack's GPM improved to 16.6% in 2025, up from 2022's 8.9%. This was mainly driven by mix upgrade. We estimate IT battery pack GPM to be only 5-10% given the mature market structure, limited customization and pricing pressure. Whereas, we estimate BBU GPM at 30-35%, supported by higher technical complexity, safety requirements, BMS integration and highly customized design. We expect higher KW BBU products to carry higher margin, as they require more advanced engineering and stricter safety design. We forecast GPM to reach 22.2%/26.0%/28.4% in 2026E/2027E/2028E.

Figure 38. Dynapack: Our GPM Assumptions

Gross Profit	2020	2021	2022	2023	2024	2025	2026E	2027E	2028E
IT	1,671	1,148	1,151	774	722	694	527	517	506
Non IT	314	353	336	414	601	1,497	3,427	5,731	8,552
Others	85	134	211	330	262	3	2	2	3
Total Gross Profit	**2,070**	**1,636**	**1,698**	**1,518**	**1,584**	**2,193**	**3,954**	**6,248**	**9,059**
IT	9.3%	6.1%	6.6%	5.0%	6.2%	8.1%	8.1%	8.1%	8.1%
Non IT	23.2%	20.0%	22.0%	24.0%	27.0%	32.4%	32.4%	32.4%	32.4%
Others	314.6%	526.5%	838.7%	1137.1%	2501.1%	11.6%	11.6%	11.6%	11.6%
Total GM%	**10.7%**	**7.9%**	**8.9%**	**8.8%**	**11.4%**	**16.6%**	**22.2%**	**26.0%**	**28.4%**

Source: Company Reports, Citi Research, Citi Research Estimates

While Dynapack will continue to invest in BBU R&D, certification, automation and capacity expansion, we expect higher margin BBU sales growth to more than offset the incremental opex burden. As BBU capacity ramps, scale benefits should become more visible. We forecast OPM to reach 15.5%/19.5%/22.1% in 2026E/2027E/2028E.

All in, we forecast earnings to rise 66%/67%/49% y/y in 2026E/2027E/2028E, implying a 2025-2028E earnings CAGR of 60%, growing much faster than sales CAGR, reflecting the combined effect of BBU volume growth, rising non-IT sales mix, gross margin expansion and strong op leverage.

Figure 39. Dynapack: Income Statement

Income Statement (NT$m)	2022	2023	2024	2025	2026E	2027E	2028E
Net Sales	**19,072**	**17,230**	**13,912**	**13,218**	**17,803**	**24,072**	**31,902**
COGS	-17,375	-15,713	-12,327	-11,025	-13,847	-17,822	-22,841
Gross Profit	**1,698**	**1,518**	**1,584**	**2,193**	**3,956**	**6,250**	**9,061**
Operating Exp.	-827	-819	-841	-946	-1,198	-1,566	-2,005
Operating Exp.-Promotion	-111	-123	-94	-95	-123	-165	-219
Operating Exp.-ADM	-315	-322	-364	-373	-460	-572	-692
Operating Exp.-R&D	-400	-374	-383	-478	-615	-828	-1,095
Operating income	**871**	**699**	**743**	**1,247**	**2,759**	**4,685**	**7,056**
Total non-operating Inc.	**270**	**378**	**2,180**	**553**	**65**	**35**	**15**
Net Interest Inc.	30	201	221	110	84	84	84
Net Investment Inc.	5	5	10	9	0	0	0
Disposal of Fixed Asset	1	-3	1,930	-19	1	0	0
Exchange Gain (Loss)	56	145	-31	369	-388	0	0
Others Income (Loss)	178	30	50	85	368	-49	-69
Pre-tax Income	**1,140**	**1,077**	**2,924**	**1,800**	**2,824**	**4,720**	**7,071**
Income Tax	-343	-289	-251	-418	-531	-897	-1,361
Net Income	**797**	**788**	**2,673**	**1,382**	**2,293**	**3,822**	**5,710**
Extraordinary gain (losses), minority interest	0	0	0	0	0	0	0
Net profit after extraordinary items	**797**	**788**	**2,673**	**1,382**	**2,293**	**3,822**	**5,710**
Adj.wtd.avg.shrs (m)	150	151	152	153	153	153	153
EPS (NT$)	**5.33**	**5.23**	**17.59**	**9.05**	**15.00**	**25.00**	**37.35**
Check							
Effective tax rate	-30%	-27%	-9%	-23%	-19%	-19%	-19%
Depreciation & Amortization	326	312	294	290	412	545	721
EBITDA	**1,437**	**1,187**	**2,997**	**1,981**	**3,152**	**5,181**	**7,708**
Margins							
Gross Margin	8.9%	8.8%	11.4%	16.6%	22.2%	26.0%	28.4%
Operating Margin	4.6%	4.1%	5.3%	9.4%	15.5%	19.5%	22.1%
Pretax Margin	6.0%	6.2%	21.0%	13.6%	15.9%	19.6%	22.2%
Net Margin	4.2%	4.6%	19.2%	10.5%	12.9%	15.9%	17.9%
EBITDA margin	7.5%	6.9%	21.5%	15.0%	17.7%	21.5%	24.2%
OPEX	4.3%	4.8%	6.0%	7.2%	6.7%	6.5%	6.3%
YoY %							
Turnover	-8.2%	-9.7%	-19.3%	-5.0%	34.7%	35.2%	32.5%
Operating Profits	2.6%	-19.7%	6.3%	67.8%	121.3%	69.8%	50.6%
Pretax Profits	-69.7%	-5.6%	171.5%	-38.4%	56.8%	67.1%	49.8%
Net Profits	-75.9%	-1.2%	239.2%	-48.3%	65.9%	66.7%	49.4%
EPS	-76.2%	-1.8%	236.1%	-48.5%	65.7%	66.7%	49.4%
OPEX	5.0%	-1.0%	2.7%	12.5%	26.5%	30.8%	28.1%

Source: Company Reports, Citi Research, Citi Research Estimates

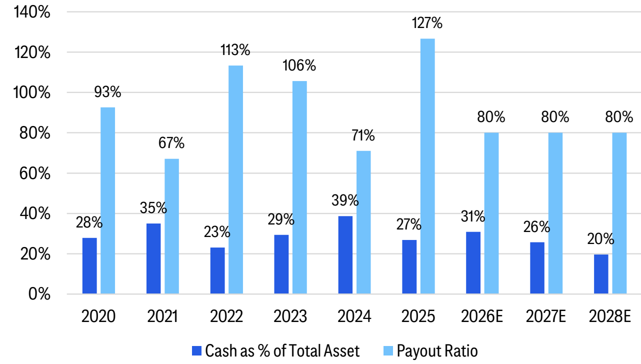
Balance Sheet and Cash Flow Analysis

We expect Dynapack's balance sheet to remain healthy through the BBU ramp-up cycle, with the company staying in a net cash position despite higher working capital needs and capacity expansion. Based on our estimate, cash and cash equivalent stay at 20-31% in 2026-2028E vs. 2025's 27%. This provides sufficient liquidity to support BBU capacity expansion, inventory preparation and product development for higher-power BBU products.

Net gearing remains negative throughout our forecast period, indicating that the company maintains a net cash balance. We believe that their capacity expansion is not overly dependent on external financing and the company still has room to fund capacity ramp-up while maintaining balance sheet flexibility.

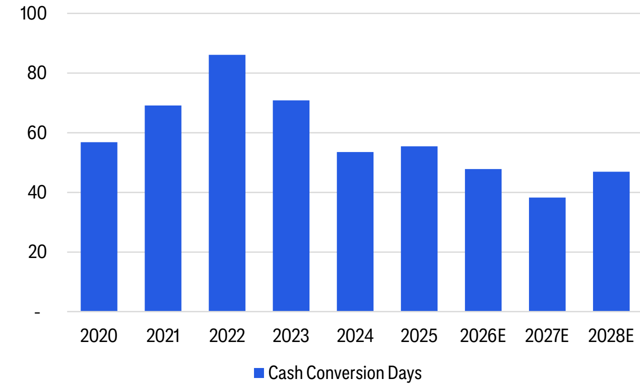
Dynapack's cash conversion lowered to 55 days in 2025, down from 2022's 86 days. We forecast it to further improve to 48 days in 2026E and 38 days in 2027E. This improvement is mainly supported by stronger payable days and better inventory discipline.

Figure 40. Dynapack: Cash and Cash Equivalent As % of Total Asset, and Payout Ratio



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 41. Dynapack: Cash Conversion Cycle



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 42. Dynapack: Balance Sheet

Balance Sheet (NT$mn)	2022	2023	2024	2025	2026E	2027E	2028E
Cash	3,058	1,990	2,539	3,438	2,643	1,966	1,159
Bank Deposit (over 3 mths)	942	2,788	3,791	747	3,092	3,092	3,092
AR/NR (reported)	5,020	4,058	3,100	3,545	3,802	5,477	8,994
Inventories	2,410	1,529	1,046	1,842	2,552	2,813	3,333
Others	635	505	811	396	427	427	427
Current Assets	**12,065**	**10,869**	**11,286**	**9,967**	**12,515**	**13,775**	**17,005**
Long-term Investments	-	-	-	-	-	-	-
Fixed Assets	1,478	1,298	1,373	1,876	2,232	2,086	1,765
Right of Use Assets	267	338	306	260	353	353	353
Other Assets	3,544	3,783	3,413	3,485	3,487	3,487	2,511
Total Assets	**17,354**	**16,288**	**16,378**	**15,589**	**18,587**	**19,701**	**21,634**
S-t Borrowings	750	400	984	-	1,581	581	581
AP/NP	2,986	3,132	2,172	2,910	3,572	4,923	5,713
Other ST liabilities	1,813	1,419	1,362	2,003	3,788	3,788	3,788
Total Current Liabilities	**5,549**	**4,951**	**4,518**	**4,913**	**8,942**	**9,292**	**10,083**
L-t Debt	1,076	969	-	-	-	-	-
Other Liabilities	2,165	1,971	1,137	703	801	801	801
Total Liabilities	**8,790**	**7,891**	**5,655**	**5,616**	**9,743**	**10,093**	**10,884**
Common Shares	1,502	1,512	1,526	1,543	1,543	1,543	1,543
Other Shareholders' Equity	7,063	6,886	9,198	8,429	7,300	8,065	9,207
Total Equity	**8,564**	**8,397**	**10,723**	**9,972**	**8,843**	**9,608**	**10,750**
Total Liab./Shrhldr's Equity	**17,354**	**16,288**	**16,378**	**15,589**	**18,587**	**19,701**	**21,634**

Source: Company Reports, Citi Research, Citi Research Estimates

Figure 43. Dynapack: Cash Flow Statement

Cash Flow (NT$ mn)	2022	2023	2024	2025	2026E	2027E	2028E
Cashflow from Operations	**970**	**3,234**	**1,206**	**1,655**	**2,413**	**3,781**	**3,185**
Net profits	797	788	2,673	1,382	2,293	3,822	5,710
Depreciation & Amortization	326	312	294	290	412	545	721
Inv. Gain/Loss (Equity)	12	8	2	50	21	0	0
Disposal of Investment	0	0	0	0	0	0	0
Working Capital Change	137	2,154	525	-500	-312	-586	-3,246
Dec(Inc)-A/R	130	972	957	-436	-257	-1,675	-3,517
Dec(Inc)-Inventory	459	1,037	528	-802	-718	-261	-520
Inc(Dec)-A/P	-452	146	-960	738	662	1,350	791
Other adjustments	-303	-28	-2,288	433	(1)	-	-
Cashflow from Investing	**1,626**	**-2,370**	**1,214**	**2,439**	**-3,066**	**-400**	**576**
(Purchases) Sale of fixed asset / (capex)	-160	-117	-146	-167	(708)	(400)	(400)
(Purchases) Sale of LT investment	0	0	0	0	-	-	-
(Purchases) Sale of ST investment	2,083	-1,893	-784	2,992	(2,325)	-	-
Other adjustments	-297	-361	2,144	-385	(32)	-	976
Cashflow from financing	**-4,467**	**-1,877**	**-2,103**	**-2,885**	**-268**	**-4,058**	**-4,568**
Increase in L-T debt	303	-589	-1,057	-19	0	0	0
Increase in S-T debt	-2,757	-350	584	-943	1,581	-1,000	0
Cash Dividend Paid	-2,248	-909	-840	-1,907	-1,834	-3,058	-4,568
Issuance of stock	0	0	0	0	0	0	0
Other adjustments	235	-29	-790	-16	-15	0	0
Exchange rate adjustment	454	-54	231	-310	125	0	0
Net change in cash	**-1,416**	**-1,068**	**549**	**899**	**-795**	**-677**	**-807**

Source: Company Reports, Citi Research, Citi Research Estimates

Dynapack (3211.TWO): Valuation Methodology and Risks

We value Dynapack based on target P/E as we believe earnings growth, margin expansion and the company's positioning in AI datacenter BBU supply chain will be the key focus areas for the market.

We use 2027E as our valuation base, as we believe 2027E would better reflect the company's earnings power after BBU capacity expansion. We apply a target P/E of 32x to our 2027E EPS of NT$25.0, and derive our target price of NT$800. Our target P/E of 32x is based on our forecast EPS CAGR of 66% over 2025-2027E and a PEG of 0.5x, benchmarked against Delta, its major PSU partner, as we expect Dynapack to grow alongside Delta.

Our target P/E of 32x is also close to the high end of historical forward P/E range of 14-31x since the stock re-rated in 2025, which we view as justified in view of Dynapack's exposure to secular AI datacenter power demand, potential BBU content value increase, margin expansion from higher non-IT sales, and improving ROE.

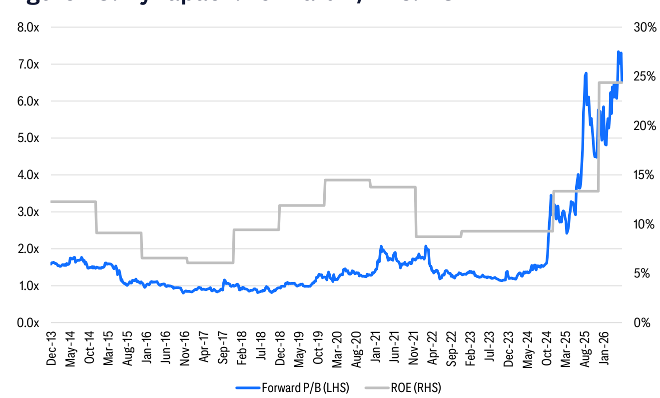
Before BBU started to become a key growth driver in 2024, Dynapack was trading at an average of 14x forward P/E, which reflected the soft outlook and rising competition of its legacy business. In 4Q24-1H26, the company was trading at 20x on average, thanks to the strong BBU demand, driving strong sales and earnings.

We believe Dynapack is likely to re-rate from its historical valuation range, supported by its transition from a mature IT battery pack supplier to an AIDC BBU beneficiary and aggressive capacity expansion, driving strong margin expansion and robust earnings momentum.

Figure 44. Dynapack: Forward P/E vs. Earnings Growth

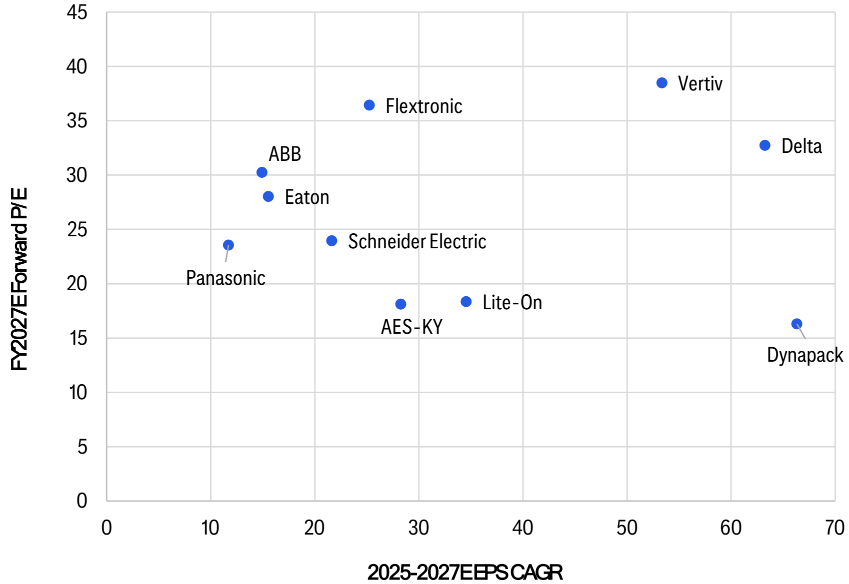
Source: Thomson Reuters, Citi Research, Citi Research Estimates

Figure 45. Dynapack: Forward P/B vs. ROE



Source: Thomson Reuters, Citi Research, Citi Research Estimates

Figure 46. Peer Comp: Forward P/E vs. Earnings CAGR



Source: Bloomberg, Citi Research, Citi Research Estimates

Key Downside Risks to Our Price Target/Rating Are:

1. **Slower-than-expected BBU adoption in AIDC:** If CSPs continue to rely mainly on centralized UPS, adopt only partial BBU deployment, or delay rack-level BBU implementation due to cost, safety or system design considerations.

2. **Delay in PSU customer qualifications:** The company's BBU growth depends heavily on qualification with PSU operators and downstream CSP programs. Any delay in PSU platform qualification or CSP validation could push revenue recognition into later periods.

3. **Competition from larger battery or power solution vendors:** Larger players may have stronger balance sheets, better cell sourcing, or broader customer relationships. If these competitors price aggressively, Dynapack's margins are likely to be under pressure.

4. **Safety, certification and reliability risks:** Any certification delay, field failure, recall or reliability issue could damage Dynapack's reputation, resulting in share losses.

Our quantitative model assigns a High Risk rating to Dynapack. However, we believe such a rating is not warranted for Dynapack due to: 1) the company is generating solid revenue and earnings growth over next 3 years; the underlying industry, BBU for AIDC, also enjoys secular growth; 2) the business model that involves with product customization and strict safety/reliability requirements would imply relatively benign competition and therefore stable pricing and margins; and 3) the company has a strong balance sheet and has been in net cash position since 2019.

Dynapack (3211.TWO): Company Overview

Established in 1998 and listed on the Taipei Exchange in 2004, Dynapack is a Taiwan-based lithium-ion battery pack manufacturer, focusing on customized battery pack design, engineering, manufacturing and system integration. Dynapack's headquarters is located in Taoyuan, Taiwan with manufacturing presence in Taiwan (A7 technology park), China, and Thailand.

Historically, Dynapack built its foundation in notebook and mobile-device battery pack with certifications from major international brands including HP, ASUS, Apple, Dell, and Microsoft. In recent years, the co has expanded beyond traditional IT applications into higher-growth non-IT segments.

Dynapack assembles battery cells with protection circuits, mechanical parts, software interfaces and related testing processes to meet customer's system requirement. Its key product categories include IT battery packs (for notebook, tablet, mobile-devices), mobility and light EV battery packs (for e-bikes, e-motors), BBU (for datacenter), energy storage and industrial applications (UPS, ESS, AGV). In 2025, non-IT sales made up 35% of group sales, up from 5-10% in 2020. We estimate BBU to make up the majority of non-IT sales.

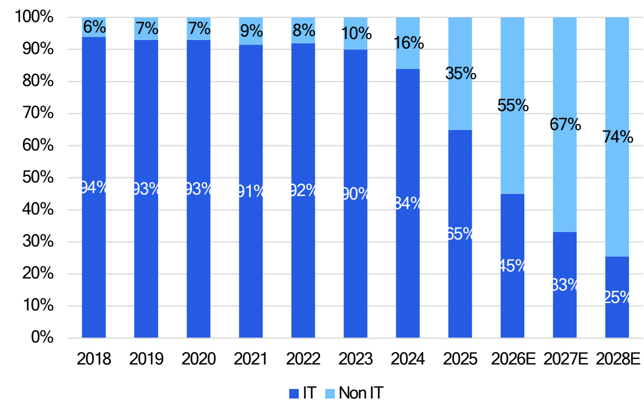
Figure 47. Dynapack: Battery Packs for IT Products

Source: Company Reports

Figure 48. Dynapack: BBU Product (3.2KW)

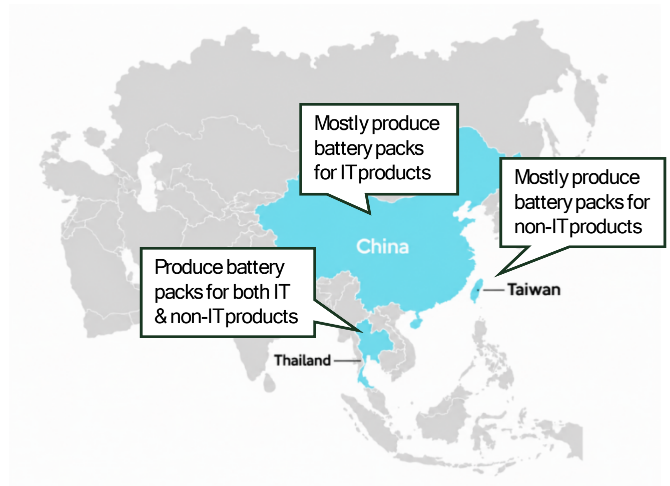
Source: Company Reports

Figure 49. Dynapack: Sales of IT vs. Non IT



Source: Company Reports, Citi Research, Citi Research Estimates

Figure 50. Dynapack: Production Presence



Source: Company Reports, Citi Research

Figure 51. Dynapack: Key Milestones

Year	Key Event
1998	Founded the company, focusing on Li-MH and Li-ion battery pack for IT products.
2000	Obtained ISO 9001 certification
2004	Received Apple approval; listed on Taipei Exchange in Nov
2006	Received Dell approval for battery pack
2009	Introduced Delta Electronics (2308.TW) as a strategic partner
2012	Won Taoyuan Airport MRT A7 Station Development Zone project; received ASUS approval
2015	Received Microsoft approval
2019	Completed construction of headquarters building in the Taoyuan MRT A7 Development Zone
2023	Established Thailand subsidiary; Executive VP Chang Chung Hsing was promoted to CEO

Source: Company Reports, Citi Research

We think the competitive edge of Dynapack comes from its long operating history, battery-pack design capability, international customer qualification, and manufacturing flexibility. It holds international certifications including ISO 9001, ISO 14001, IECQ QC080000, ISO 13485, ISO 17025, UL and TUV-related certifications. Their capabilities allow the company to provide customized battery pack solutions, while maintaining quality and reliability.

Real Estate Assets Provide Non-operating Earnings Support

Dynapack's real estate assets have provided meaningful non-operating earnings support in 2021 and 2024. The company owns land assets around Taoyuan's A7 area and has monetized part of these asset through disposal and development projects. In 2021, Dynapack sold its Guishan factory/office building and related land, contributing c.NT$16/share to EPS. In 2024, the company recognized gains from A7 land development and property disposal, contributing c.NT$12/share to EPS. Going forward, the remaining A7 land could still provide additional asset value or disposal gains.

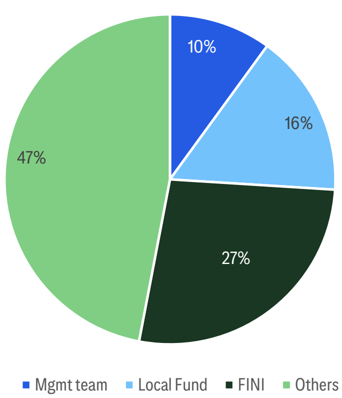
Shareholder Structure

As of June 2026, Chairman Chung Tsung Ming is the largest shareholder, holding c.7% of total shares. The overall founder and his family owns c.10% of total shares. Local funds represented c.16% of shares while foreign investors made up 27% of shares as of July 6th 2026.

Key Management Team

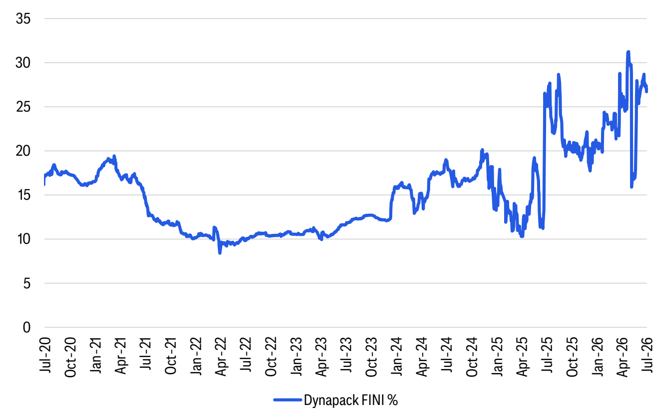
- **Chung Tsung Ming (Chairman) –** Chairman Chung has a finance and accounting background with an MBA from National Chengchi University and a bachelor's degree in accounting from the National Taiwan University. Prior to Dynapack, he was a partner at Deloitte. He has served on Dynapack's board since 2002.
- **Chang Chung Hsing (CEO) –** President Chang was appointed in 2023. He holds a master's degree in electrical engineering from Chung Yuan University. Before joining Dynapack, he worked as a senior manager of the power R&D center at Dell.
- **Lin Yu Hui (CFO) –** Ms. Lin serves as senior finance executive and the company's spokesperson. She holds a master's degree in Accounting from National Taiwan University. She was the manager of the audit department at Deloitte before joining the firm.

Figure 52. Dynapack: Shareholder Structure



Source: Company Reports, Bloomberg, Citi Research

Figure 53. Dynapack: FINI Holding %



Source: Citi Research, TEJ

Advanced Energy Solution (6781.TW)

Buy | TP **NT$1,680.00** from NT$1,660.00 | Price NT$1,250.00 (06 Jul 26 13:30)

Reiterate Buy on strong AIDC BBU demand and HVDC migration — We remain constructive on AES as one of the beneficiaries of AIDC BBU adoption. BBU now contributes >70% of sales and should remain the key earnings driver as AI rack power continues to rise. We expect AES to benefit from higher BBU content per rack and deep CSP engagement as the industry transitions from conventional 48V systems to HVDC architecture.

HVDC BBU mass production targeted from 2H26E through 1Q27E — We expect high-voltage (+/-400V and 800V) BBU solutions to enter volume production in early 2027, supported by next-generation AI racks with higher power density. The transition raises technical barriers which should favor established suppliers with proven system integration capability. While the market remains conservative on HVDC architecture progress, we see upside if commercialization progresses on schedule and BBU penetration continues to expand alongside AI rack deployment.

Product diversifications outside of BBU; expanding capacity in China and Vietnam — In addition to BBU, we also see continued product diversifications into telecom, AGV/AMR and forklifting applications, although AIDC BBU should remain the dominant growth engine in the next 2- 3 years in our view. AES is accelerating capacity expansion in Vietnam and China to support the upcoming HVDC ramp. The company expects capex to increase 20-30% y/y in 2026E. As production scales, we expect stronger operating leverage and have more confidence in sustaining earnings growth in 2027E onwards.

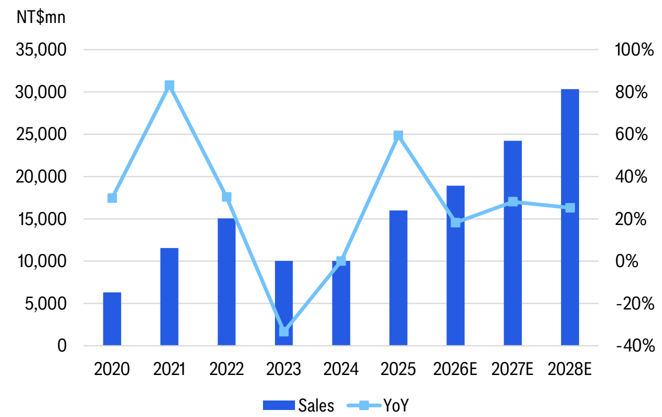
Earnings estimates and TP revision — We lower our earnings est 11%/7% in 2026E/2027E to factor in higher opex assumptions, primarily driven by the ongoing investment in RD to support the upcoming HVDC ramp. Despite the earnings revisions, we raise our target price to NT$1,680 (from NT$1,660) as we roll forward our valuation base to 2027E EPS. We assign a 27x target P/E, on par with its historical average since listing. We use 2027E as the year of valuation base as we think 2027E can better reflect its earnings power following the commercialization of HVDC products.

Earnings Summary

Year to 31 Dec	Net Profit (NT$M)	Diluted EPS (NT$)	EPS growth (%)	P/E (x)	P/B (x)	ROE (%)	Yield (%)
2024A	2,169	25.39	10.2	49.2	7.3	15.7	1.0
2025A	3,263	38.20	50.4	32.7	6.4	20.7	1.5
2026E	3,959	46.35	21.3	27.0	5.2	21.2	1.8
2027E	5,240	61.35	32.4	20.4	4.5	23.6	2.4
2028E	6,671	78.09	27.3	16.0	3.8	25.7	3.1

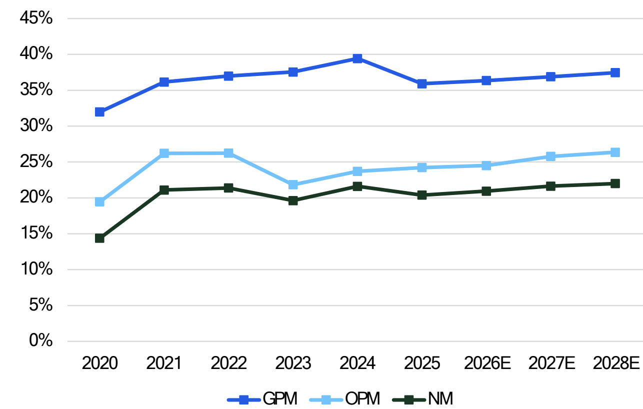
Source: Powered by dataCentral

Figure 54. AES: Sales Growth and Y/Y



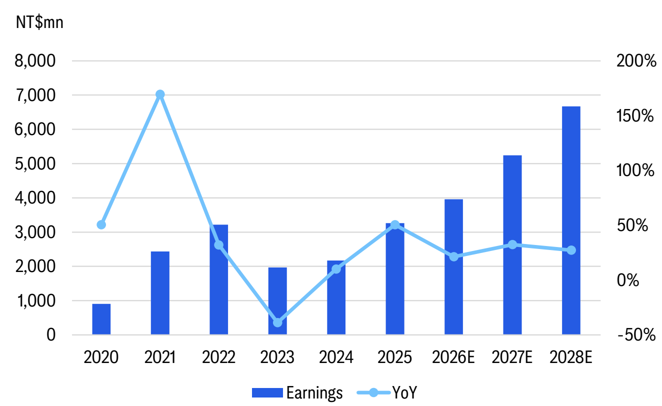
Source: Citi Research, Citi Research Estimates

Figure 55. AES: Margins Trend



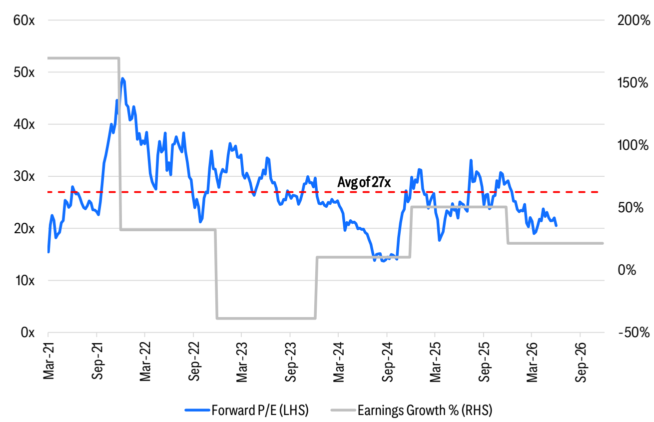
Source: Citi Research, Citi Research Estimates

Figure 56. AES: Earnings Growth and Y/Y



Source: Citi Research, Citi Research Estimates

Figure 57. AES: Forward P/E and Earnings Growth



Source: Citi Research, Citi Research Estimates

Figure 58. AES: Earnings Estimates Revisions

	FY26E			FY27E			FY28E
NT$mn	New	Old	Chg	New	Old	Chg	New
Net Sales	18,913	19,646	-3.7%	24,221	24,557	-1.4%	30,325
Gross profit	6,874	7,485	-8.2%	8,934	9,379	-4.7%	11,355
OPEX	2,238	2,233	0.2%	2,692	2,615	2.9%	3,362
Operating profit	4,635	5,252	-11.7%	6,242	6,764	-7.7%	7,993
Pre-tax profit	5,017	5,611	-10.6%	6,633	7,126	-6.9%	8,444
Net profit	3,959	4,432	-10.7%	5,240	5,630	-6.9%	6,671
EPS	46.35	51.89	-10.7%	61.35	65.91	-6.9%	78.09
Ratio	**New**	**Old**	**diff**	**New**	**Old**	**diff**	**New**
Gross margin (%)	36.34	36.89	(0.54)	36.89	37.44	(0.56)	37.44
OPEX to Sales ratio(%)	11.84	11.11	0.72	11.11	11.09	0.03	11.09
Operating margin (%)	24.51	25.77	(1.26)	25.77	26.36	(0.59)	26.36
Net margin (%)	20.93	21.64	(0.70)	21.64	22.00	(0.36)	22.00

Source: Citi Research, Citi Research Estimates

6781.TW: Fiscal year end 31-Dec

Price: NT$1,250.00; TP: NT$1,680.00; Market Cap: NT$106,773m; Recomm: Buy

Profit & Loss (NT$m)	2024	2025	2026E	2027E	2028E
Sales revenue	10,037	16,001	18,913	24,221	30,325
Cost of sales	-6,081	-10,255	-12,039	-15,287	-18,970
Gross profit	3,956	5,746	6,874	8,934	11,355
Gross Margin (%)	39.4	35.9	36.3	36.9	37.4
EBITDA (Adj)	**2,712**	**4,276**	**5,130**	**6,737**	**8,488**
EBITDA Margin (Adj) (%)	27.0	26.7	27.1	27.8	28.0
Depreciation	-333	-399	-495	-495	-495
Amortisation	0	0	0	0	0
EBIT (Adj)	**2,379**	**3,877**	**4,635**	**6,242**	**7,993**
EBIT Margin (Adj) (%)	23.7	24.2	24.5	25.8	26.4
Net interest	246	254	322	294	329
Associates	0	0	0	0	0
Non-Op/Except/Other Adj	128	8	59	97	121
Pre-tax profit	**2,754**	**4,139**	**5,017**	**6,633**	**8,444**
Tax	-585	-876	-1,058	-1,393	-1,773
Extraord./Min.Int./Pref.div.	0	0	0	0	0
Reported net profit	**2,169**	**3,263**	**3,959**	**5,240**	**6,671**
Net Margin (%)	21.6	20.4	20.9	21.6	22.0
Core NPAT	2,169	3,263	3,959	5,240	6,671
Per share data	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Reported EPS ($)	25.39	38.20	46.35	61.35	78.09
Core EPS ($)	25.39	38.20	46.35	61.35	78.09
DPS ($)	12.50	18.81	22.82	30.21	38.45
CFPS ($)	29.13	31.35	62.51	30.83	64.74
FCFPS ($)	24.28	23.95	58.03	24.39	58.30
BVPS ($)	172.28	196.68	241.21	279.73	327.62
Wtd avg ord shares (m)	85.4	85.4	85.4	85.4	85.4
Wtd avg diluted shares (m)	85.4	85.4	85.4	85.4	85.4
Growth rates	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Sales revenue (%)	0.1	59.4	18.2	28.1	25.2
EBIT (Adj) (%)	8.6	62.9	19.6	34.7	28.0
Core NPAT (%)	10.2	50.4	21.3	32.4	27.3
Core EPS (%)	10.2	50.4	21.3	32.4	27.3
Balance Sheet (NT$m)	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Cash & cash equiv.	7,410	8,833	14,618	14,822	17,296
Accounts receivables	1,800	1,971	2,871	4,422	5,444
Inventory	7,504	8,975	8,095	12,578	15,419
Net fixed & other tangibles	1,782	2,085	1,973	2,028	2,083
Goodwill & intangibles	0	0	0	0	0
Financial & other assets	2,083	2,907	1,531	1,614	1,684
Total assets	**20,579**	**24,772**	**29,089**	**35,464**	**41,925**
Accounts payable	2,174	2,663	1,878	2,920	3,579
Short-term debt	449	790	865	934	1,009
Long-term debt	0	0	0	0	0
Provisions & other liab	3,238	4,518	5,742	7,715	9,351
Total liabilities	**5,862**	**7,971**	**8,485**	**11,568**	**13,939**
Shareholders' equity	14,716	16,800	20,604	23,895	27,985
Minority interests	1	1	1	1	1
Total equity	**14,717**	**16,801**	**20,604**	**23,895**	**27,986**
Net debt (Adj)	**-6,960**	**-8,043**	**-13,754**	**-13,888**	**-16,287**
Net debt to equity (Adj) (%)	-47.3	-47.9	-66.8	-58.1	-58.2

Valuation ratios	2024	2025	2026E	2027E	2028E
PE (x)	49.2	32.7	27.0	20.4	16.0
PB (x)	7.3	6.4	5.2	4.5	3.8
EV/EBITDA (x)	36.6	22.8	18.4	13.6	10.6
FCF yield (%)	1.9	1.9	4.6	2.0	4.7
Dividend yield (%)	1.0	1.5	1.8	2.4	3.1
Payout ratio (%)	49	49	49	49	49
ROE (%)	15.7	20.7	21.2	23.6	25.7
Cashflow (NT$m)	**2024**	**2025**	**2026E**	**2027E**	**2028E**
EBITDA	2,712	4,276	5,130	6,737	8,488
Working capital	-35	-1,016	885	-3,102	-1,636
Other	-189	-581	-676	-1,002	-1,323
Operating cashflow	**2,488**	**2,678**	**5,340**	**2,633**	**5,530**
Capex	-414	-632	-383	-550	-550
Net acq/disposals	2,528	196	782	0	0
Other	0	0	0	0	0
Investing cashflow	**2,114**	**-437**	**399**	**-550**	**-550**
Dividends paid	-991	-1,068	-1,606	-1,949	-2,580
Financing cashflow	**-2,504**	**-739**	**47**	**-1,880**	**-2,505**
Net change in cash	**2,697**	**1,416**	**5,785**	**203**	**2,475**
Free cashflow to s/holders	**2,074**	**2,046**	**4,957**	**2,083**	**4,980**

For definitions of the items in this table, please click here.

3211.TWO: Fiscal year end 31-Dec

Price: NT$422.50; TP: NT$800.00; Market Cap: NT$65,194m; Recomm: Buy

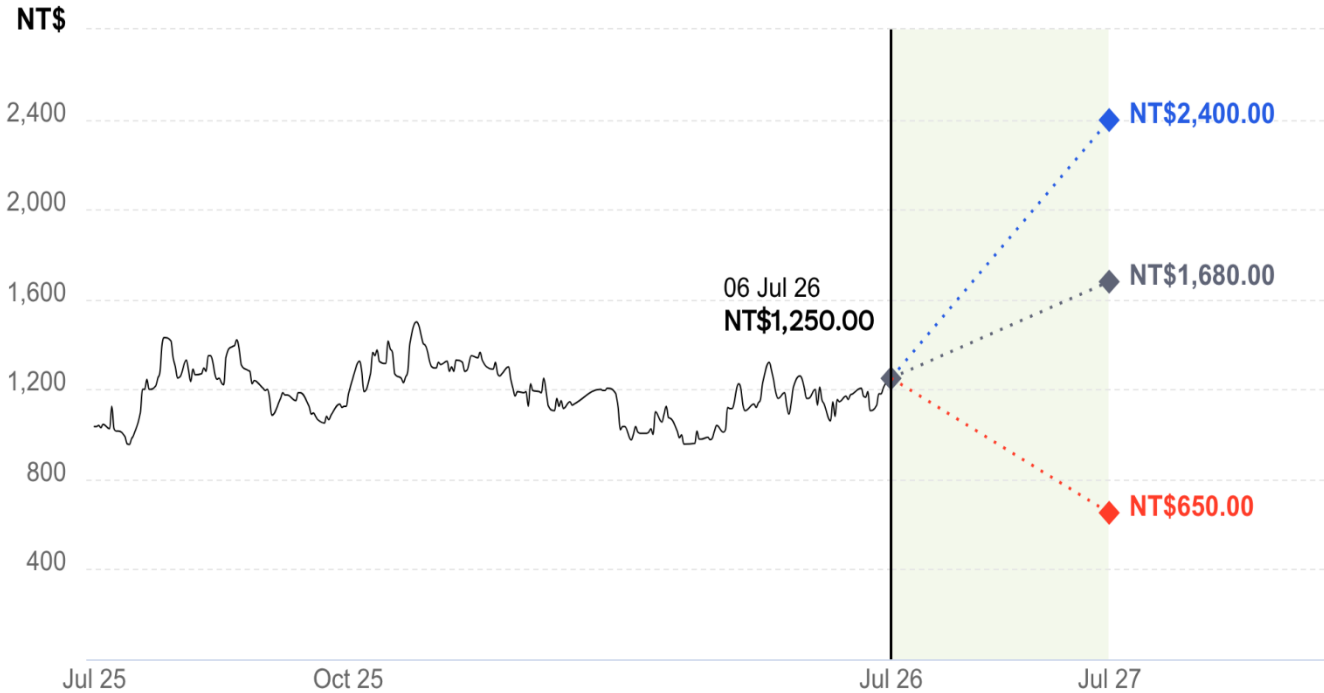
Profit & Loss (NT$m)	2024	2025	2026E	2027E	2028E
Sales revenue	13,912	13,218	17,803	24,072	31,902
Cost of sales	-12,327	-11,025	-13,847	-17,822	-22,841
Gross profit	1,584	2,193	3,956	6,250	9,061
Gross Margin (%)	11.4	16.6	22.2	26.0	28.4
EBITDA (Adj)	**2,997**	**1,981**	**3,152**	**5,181**	**7,708**
EBITDA Margin (Adj) (%)	21.5	15.0	17.7	21.5	24.2
Depreciation	-294	-290	-412	-545	-721
Amortisation	0	0	0	0	0
EBIT (Adj)	**743**	**1,247**	**2,759**	**4,685**	**7,056**
EBIT Margin (Adj) (%)	5.3	9.4	15.5	19.5	22.1
Net interest	0	0	0	0	0
Associates	0	0	0	0	0
Non-Op/Except/Other Adj	2,180	553	65	35	15
Pre-tax profit	**2,924**	**1,800**	**2,824**	**4,720**	**7,071**
Tax	-251	-418	-531	-897	-1,361
Extraord./Min.Int./Pref.div.	0	0	0	0	0
Reported net profit	**2,673**	**1,382**	**2,293**	**3,822**	**5,710**
Net Margin (%)	19.2	10.5	12.9	15.9	17.9
Core NPAT	2,673	1,382	2,293	3,822	5,710
Per share data	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Reported EPS ($)	17.59	9.05	15.00	25.00	37.35
Core EPS ($)	17.59	9.05	15.00	25.00	37.35
DPS ($)	12.50	11.47	12.00	20.00	29.88
CFPS ($)	7.94	10.84	15.79	24.74	20.84
FCFPS ($)	6.98	9.75	11.29	20.81	16.91
BVPS ($)	70.58	65.33	57.85	62.85	70.33
Wtd avg ord shares (m)	152	153	153	153	153
Wtd avg diluted shares (m)	152	153	153	153	153
Growth rates	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Sales revenue (%)	-19.3	-5.0	34.7	35.2	32.5
EBIT (Adj) (%)	6.3	67.8	121.3	69.8	50.6
Core NPAT (%)	239.2	-48.3	65.9	66.7	49.4
Core EPS (%)	236.1	-48.5	65.7	66.7	49.4
Balance Sheet (NT$m)	**2024**	**2025**	**2026E**	**2027E**	**2028E**
Cash & cash equiv.	6,330	4,185	5,754	4,878	3,871
Accounts receivables	3,100	3,545	3,802	5,477	8,994
Inventory	1,046	1,842	2,552	2,813	3,333
Net fixed & other tangibles	4,786	5,361	5,699	5,754	4,656
Goodwill & intangibles	306	260	353	353	353
Financial & other assets	811	396	427	427	427
Total assets	**16,378**	**15,589**	**18,587**	**19,701**	**21,634**
Accounts payable	2,172	2,910	3,572	4,923	5,713
Short-term debt	984	0	1,581	581	581
Long-term debt	0	0	0	0	0
Provisions & other liab	2,499	2,706	4,590	4,590	4,590
Total liabilities	**5,655**	**5,616**	**9,743**	**10,093**	**10,884**
Shareholders' equity	10,723	9,972	8,843	9,608	10,750
Minority interests	0	0	0	0	0
Total equity	**10,723**	**9,972**	**8,843**	**9,608**	**10,750**
Net debt (Adj)	**-5,346**	**-4,185**	**-4,173**	**-4,297**	**-3,290**
Net debt to equity (Adj) (%)	-49.9	-42.0	-47.2	-44.7	-30.6

Valuation ratios	2024	2025	2026E	2027E	2028E
PE (x)	24.0	46.7	28.2	16.9	11.3
PB (x)	6.0	6.5	7.3	6.7	6.0
EV/EBITDA (x)	20.3	30.5	19.4	11.8	8.0
FCF yield (%)	1.7	2.3	2.7	4.9	4.0
Dividend yield (%)	3.0	2.7	2.8	4.7	7.1
Payout ratio (%)	71	127	80	80	80
ROE (%)	28.0	13.4	24.4	41.4	56.1
Cashflow (NT$m)	**2024**	**2025**	**2026E**	**2027E**	**2028E**
EBITDA	1,038	1,537	3,171	5,230	7,777
Working capital	525	-500	-312	-586	-3,246
Other	-356	618	-445	-862	-1,346
Operating cashflow	**1,206**	**1,655**	**2,413**	**3,781**	**3,185**
Capex	-146	-167	-688	-600	-600
Net acq/disposals	-784	2,992	-2,325	0	0
Other	2,144	-385	-32	0	976
Investing cashflow	**1,214**	**2,439**	**-3,046**	**-600**	**376**
Dividends paid	-840	-1,907	-1,834	-3,058	-4,568
Financing cashflow	**-2,103**	**-2,885**	**-268**	**-4,058**	**-4,568**
Net change in cash	**549**	**899**	**-775**	**-877**	**-1,007**
Free cashflow to s/holders	**1,060**	**1,488**	**1,725**	**3,181**	**2,585**

For definitions of the items in this table, please click here.

Bull/Bear: Advanced Energy Solution (6781.TW)

NT$2,400.00	NT$1,680.00	NT$650.00
▲92% Upside	▲34% Upside	▼48% Downside



Spread 140pp
Current Price and expected returns (upside/downside) as of 06 Jul 2026

BULL Assumptions

- Target PE at 40x

BASE Assumptions

- Sales CAGR 24% and earnings CAGR 27% in 2025-2028E.
- Target PE at 27x

BEAR Assumptions

- Target PE at 18x

Bull/Bear: Dynapack International (3211.TWO)

NT$1,000.00	NT$800.00	NT$390.00
▲137% Upside	▲89% Upside	▼7.7% Downside

Spread 144pp
Current Price and expected returns (upside/downside) as of 06 Jul 2026

BULL Assumptions

- Sales CAGR of 40% in 2025-2027E
- Earnings CAGR of 75% in 2025-2027E
- 2027E target P/E of 35x

BASE Assumptions

- Sales CAGR of 35% in 2025-2027E
- Earnings CAGR of 66% in 2025-2027E
- 2027E target P/E of 32x

BEAR Assumptions

- Sales CAGR of 25% in 2025-2027E
- Earnings CAGR of 40% in 2025-2027E
- 2027E target P/E of 18x

Advanced Energy Solution

Company description

Established in January 2020 and listed in March 2021, Advanced Energy Solution Holdings (AES) is a holding company registered in Cayman Island, supplying battery packs for LEV (light electrical vehicle such as e-Bikes) and BBU (battery back-up unit for datacenters) applications. Prior to the establishment and IPO, AES was a BU focusing on non-IT applications within its parent company, Simplo Technology (6121.TW).

Investment strategy

We rate AES shares as Buy. Being an industry leader in battery pack design and manufacturing with a proven track record, we expect AES to benefit from higher BBU content per rack and deep CSP engagement as the industry transitions from conventional 48V systems to HVDC architecture. BBU now contributes >70% of sales and should remain the key earnings driver as AI rack power continues to rise. We forecast earnings CAGR of 27% in 2025-2028E, supported by strong BBU demand, mix upgrade toward high-power BBU products and op leverage.

Valuation

Our target price of NT$1,680 is based on 27x 2026E EPS on par with its historical average since listing and supported by a 2025-28E earnings CAGR of 27%. We use 2027E as the year of valuation base as we think 2027E can better reflect its earnings power after the commercializarion of HVDC products.

Risks

Key downside risks to our earnings forecasts that could prevent the shares from reaching our target price include: 1) slower-than-expected end demand from e-Bikes post the pandemic and volaitlity in cloud capex deployment that could impact datacenter BBU sales; 2) component supply constraints/logistics challenges, which could lead to slower-than-expected shipment and top-line momentum; and 3) peer competition, which could impact sales growth and margins negatively, in our view.

Dynapack International

Company description

Established in 1998 and listed on the Taipei Exchange in 2004, Dynapack is a Taiwan-based lithium-ion battery pack manufacturer, focusing on customized battery pack design, engineering, manufacturing and system integration. Dynapack built its foundation in notebook and mobile-device battery packs with certifications from major international brands. In recent years, it has expanded beyond traditional IT applications into higher-growth non-IT segments. In 2025, non-IT sales made up 35% of group sales, up from 5-10% in 2020. We estimate BBU to make up the majority of non-IT sales.

Investment strategy

We have a Buy rating on Dynapack shares. Our positive view is driven by Dynapack's transition from a mature IT battery pack supplier to a key beneficiary of AIDC BBU demand. As AI rack power density rises, we expect BBU adoption and content value per rack to increase, supporting robust revenue growth. We also expect meaningful margin expansion as product mix shifts toward higher-margin BBU products. In addition, Dynapack's partnership with multiple PSU operators should broaden its access to CSP and AIDC customers. We forecast earnings CAGR of 60% in 2025-2028E.

Valuation

We assign a 32x target P/E to our 2027E EPS of NT$25 to derive a target price of NT$800. We value Dynapack based on 2027E target P/E as we believe 2027E better reflects its earnings power after BBU capacity expansion. Our target P/E of 32x is based on our forecast EPS CAGR of 66% in 2025-2027E and a PEG of 0.5x, which we benchmark against its major PSU partner, as we expect Dynapack to grow alongside its partner.

Risks

Our quantitative model assigns a High Risk rating to Dynapack. However, we believe such a rating is not warranted for Dynapack due to: 1) the company is generating solid revenue and earnings growth over next 3 years; the underlying industry, BBU for AIDC, also enjoys secular growth; 2) the business model that involves with product customization and strict safety/reliability requirements would imply relatively benign competition and therefore stable pricing and margins; and 3) the company has a strong balance sheet and has been in net cash position since 2019.

Key downside risks to our price target/rating are: 1) Slower-than-expected BBU adoption in AIDC, 2) Delay in PSU customer qualifications, 3) Competition from larger battery or power solution vendors, 4) Safety, certification and reliability issues.

If you are visually impaired and would like to speak to a Citi representative regarding the details of the graphics in this document, please call USA 1-888-500-5008 (TTY: 711), from outside the US +1-210-677-3788

Appendix A-1

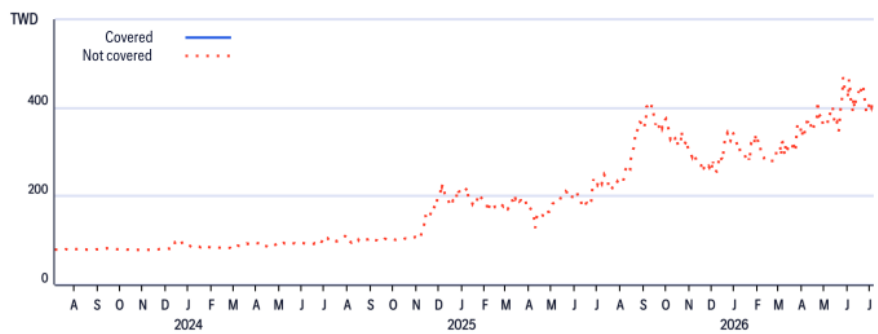
ANALYST CERTIFICATION

The research analysts primarily responsible for the preparation and content of this research report are either (i) designated by "AC" in the author block or (ii) listed in bold alongside content which is attributable to that analyst. If multiple AC analysts are designated in the author block, each analyst is certifying with respect to the entire research report other than (a) content attributable to another AC certifying analyst listed in bold alongside the content and (b) views expressed solely with respect to a specific issuer which are attributable to another AC certifying analyst identified in the price charts or rating history tables for that issuer shown below. Each of these analysts certify, with respect to the sections of the report for which they are responsible: (1) that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc. and its affiliates; and (2) no part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

Dynapack International (3211.TWO)

Ratings and Target Price History
Fundamental Research



*Indicates Change

Rating/target price changes above reflect Eastern Time

Samsung SDI (006400.KS)

Ratings and Target Price History
Fundamental Research

Analyst: Peter Lee

	Date	Rating	Target Price	Closing Price
1	27-Oct-23 13:38:06	3	*361,898.11	442,102.56
2	30-Jan-24 04:48:55	3	*303,211.93	366,299.57
3	30-Jul-24 05:23:45	3	*268,978.33	323,263.04
4	12-Nov-24 08:24:40	3	*254,306.78	258,708.24
5	13-Feb-25 10:23:33	3	*176,058.54	209,314.04
6	29-Apr-25 02:31:22	*2	*195,000.00	183,600.00
7	31-Jul-25 19:20:02	2	*210,000.00	201,000.00
8	28-Oct-25 19:20:01	2	*350,000.00	312,000.00
9	02-Feb-26 08:27:05	2	*385,000.00	356,000.00
10	28-Apr-26 05:24:21	*1	*900,000.00	680,000.00

*Indicates Change

Rating/target price changes above reflect Eastern Time

LG Energy Solution (373220.KS)

Ratings and Target Price History
Fundamental Research

Analyst: Oscar Yee

	Date	Rating	Target Price	Closing Price
1	25-Oct-23 15:19:32	1	*590,000.00	409,500.00
2	26-Jan-24 10:44:35	1	*470,000.00	381,000.00
3	18-Apr-24 16:42:46	1	*440,000.00	377,000.00
4	04-Jul-24 11:40:58	*2	*390,000.00	359,000.00
5	25-Jul-24 16:09:10	2	*378,000.00	332,500.00
6	15-Aug-24 05:13:26	2	*368,000.00	337,000.00
7	31-Jan-25 15:42:18	*1	*440,000.00	352,000.00
8	01-May-25 07:33:44	1	*420,000.00	324,500.00
9	31-Oct-25 02:31:17	1	*565,000.00	473,000.00

*Indicates Change

Rating/target price changes above reflect Eastern Time

Advanced Energy Solution (6781.TW)

Ratings and Target Price History
Fundamental Research

Analyst: Angela Hsu

	Date	Rating	Target Price	Closing Price
1	12-Jan-24 03:58:35	1	*805.00	641.00
2	11-Mar-24 07:08:28	1	*870.00	731.00
3	07-May-24 05:19:12	1	*820.00	630.00
4	30-Aug-24 05:12:48	1	*670.00	515.00
5	15-Nov-24 07:46:33	1	*1,020.00	772.00
6	11-Feb-25 04:53:18	1	*1,220.00	1,065.00
7	10-Jun-25 00:11:45	1	*1,330.00	1,025.00
8	26-Aug-25 23:59:20	1	*1,660.00	1,295.00

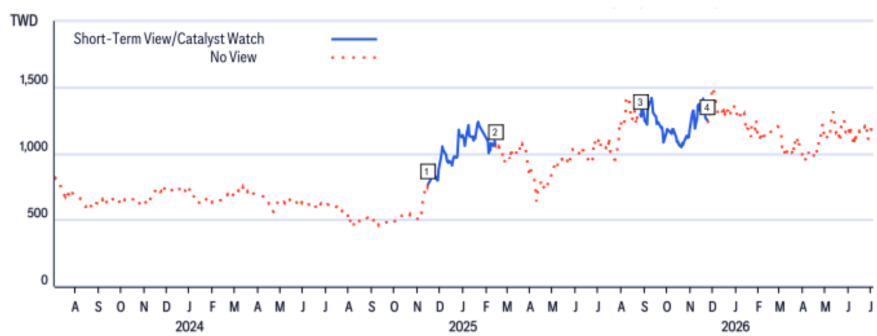
*Indicates Change

Rating/target price changes above reflect Eastern Time

Advanced Energy Solution (6781.TW)

Short-Term View/Catalyst Watch Research

Analyst: Angela Hsu



	Date	Action	Expected Direction	Duration	Closing Price
1	15-Nov-24 02:46:33	Add STV	Upside	90 Days	772.00
2	13-Feb-25 19:44:16	Remove STV	Upside	90 Days	1,065.00
3	26-Aug-25 19:59:20	Add STV	Upside	90 Days	1,295.00
4	24-Nov-25 19:44:47	Remove STV	Upside	90 Days	1,250.00

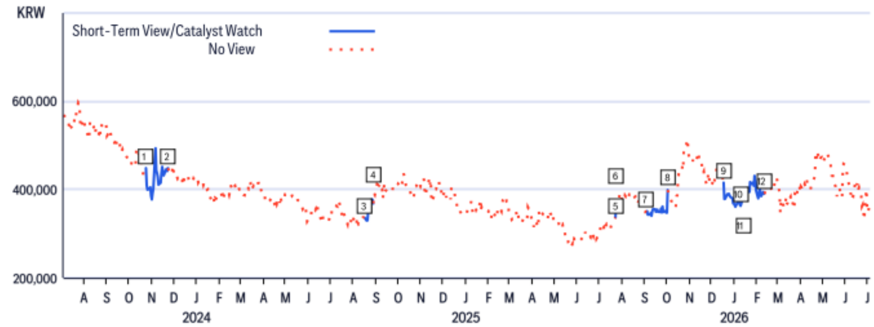
CW - Catalyst Watch , STV - Short-Term View

Rating/target price changes above reflect Eastern Time

LG Energy Solution (373220.KS)

Short-Term View/Catalyst Watch Research

Analyst: Oscar Yee



	Date	Action	Expected Direction	Duration	Closing Price
1	24-Oct-23 12:35:17	Add CW	Downside	30 Days	448,500.00
2	23-Nov-23 21:13:27	Remove CW	Downside	30 Days	448,500.00
3	18-Aug-24 22:31:20	Add CW	Downside	30 Days	336,500.00
4	28-Aug-24 23:39:54	Remove CW	Downside	30 Days	368,500.00
5	23-Jul-25 00:58:22	Add CW	Downside	30 Days	336,500.00
6	24-Jul-25 23:11:18	Remove CW	Downside	30 Days	368,000.00
7	03-Sep-25 09:56:13	Add STV	Upside	30 Days	348,500.00
8	03-Oct-25 14:14:39	Remove STV	Upside	30 Days	399,000.00
9	17-Dec-25 03:39:17	Add CW	Downside	30 Days	415,500.00
10	11-Jan-26 10:55:36	Remove CW	Downside	30 Days	363,000.00
11	11-Jan-26 10:55:36	Add STV	Upside	30 Days	326,444.45
12	10-Feb-26 21:14:43	Remove STV	Upside	30 Days	390,500.00

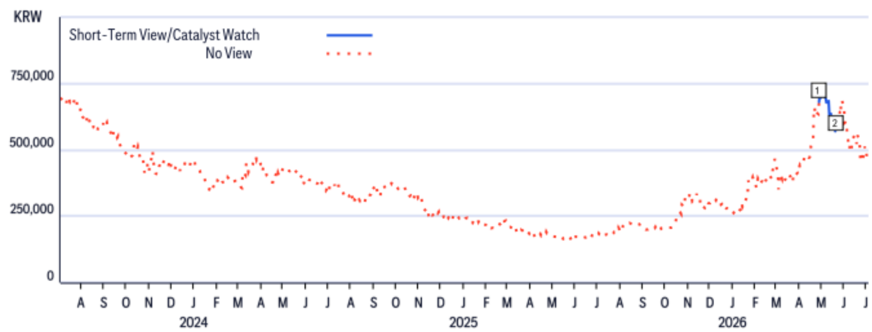
CW - Catalyst Watch , STV - Short-Term View

Rating/target price changes above reflect Eastern Time

Samsung SDI (006400.KS)

Short-Term View/Catalyst Watch Research

Analyst: Peter Lee



	Date	Action	Expected Direction	Duration	Closing Price
1	28-Apr-26 01:24:21	Add CW	Upside	90 Days	680,000.00
2	21-May-26 02:48:33	Remove CW	Upside	90 Days	616,000.00

CW - Catalyst Watch , STV - Short-Term View

Rating/target price changes above reflect Eastern Time

The Firm has made a market in the publicly traded equity securities of Contemporary Amperex Technology Co Ltd on at least one occasion since 1 Jan 2025.

The Firm has made a market in the publicly traded equity securities of BYD Co Ltd on at least one occasion since 1 Jan 2025.

A member of Citigroup's Board of Directors is also on the Board of Directors of Emerson Electric Co.

Citigroup Global Markets Inc. or its affiliates beneficially owns 1% or more of any class of common equity securities of Dynapack International. This position reflects information available as of the prior business day.

Citigroup Global Markets Inc. or its affiliates has a net short position of 0.5% or more of any class of common equity securities of Panasonic Holdings.

Citigroup Global Markets Inc. or its affiliates beneficially owns 2.0% or more of any class of common equity securities of Dynapack International.

Within the past 12 months, Citigroup Global Markets Inc. or its affiliates has acted as manager or co-manager of an offering of securities of LG Energy Solution,Schneider Electric,Vertiv Holdings Co.

Citigroup Global Markets Inc. or its affiliates has received compensation for investment banking services provided within the past 12 months from ABB,Eaton Corp,LG Energy Solution,Schneider Electric,Siemens Energy AG,Vertiv Holdings Co.

Citigroup Global Markets Inc. or its affiliates expects to receive or intends to seek, within the next three months, compensation for investment banking services from Eve Energy.

Citigroup Global Markets Inc. or its affiliates received compensation for products and services other than investment banking services from ABB,Advanced Energy Solution,BYD,CATL,Delta Electronics,Eaton Corp,Emerson Electric Co.,Eve Energy,LG Energy Solution,Murata,Panasonic Holdings,Samsung SDI,Schneider Electric,Siemens Energy AG,Simplo Technology,Vertiv Holdings Co in the past 12 months.

Citigroup Global Markets Inc. or its affiliates currently has, or had within the past 12 months, the following as investment banking client(s): ABB,Eaton Corp,Eve Energy,LG Energy Solution,Schneider Electric,Siemens Energy AG,Vertiv Holdings Co.

Citigroup Global Markets Inc. or its affiliates currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, securities-related: ABB,Advanced Energy Solution,BYD,CATL,Delta Electronics,Eaton Corp,Emerson Electric Co.,LG Energy Solution,Panasonic Holdings,Samsung SDI,Schneider Electric,Siemens Energy AG,Simplo Technology,Vertiv Holdings Co.

Citigroup Global Markets Inc. or its affiliates currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, non-securities-related: ABB,Advanced Energy Solution,BYD,CATL,Delta Electronics,Eaton Corp,Emerson Electric Co.,Eve Energy,LG Energy Solution,Murata,Panasonic Holdings,Samsung SDI,Schneider Electric,Siemens Energy AG,Simplo Technology,Vertiv Holdings Co.

Citigroup Global Markets Inc. and/or its affiliates has a significant financial interest in relation to ABB,BYD,CATL,Delta Electronics,Eaton Corp,Emerson Electric Co.,Schneider Electric,Siemens Energy AG,Vertiv Holdings Co. (For an explanation of the determination of significant financial interest, please refer to the policy for managing conflicts of interest which can be found at www.citiVelocity.com.)

Analysts' compensation is determined by Citi Research management and Citigroup's senior management and is based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates (the "Firm"). Compensation is not linked to specific transactions or recommendations. Like all Firm employees, analysts receive compensation that is impacted by overall Firm profitability which includes investment banking, sales and trading, and principal trading revenues. One factor in equity research analyst compensation is arranging corporate access events between institutional clients and the management teams of covered companies. Typically, company management is more likely to participate when the analyst has a positive view of the company.

For financial instruments recommended in the Product in which the Firm is not a market maker, the Firm is a liquidity provider in such financial instruments (and any underlying instruments) and may act as principal in connection with transactions in such instruments. The Firm is a regular issuer of traded financial instruments linked to securities that may have been recommended in the Product. The Firm regularly trades in the securities of the issuer(s) discussed in the Product. The Firm may engage in securities transactions in a manner inconsistent with the Product and, with respect to securities covered by the Product, will buy or sell from customers on a principal basis.

The Firm is a market maker in the publicly traded equity securities of BYD,CATL.

Unless stated otherwise neither the Research Analyst nor any member of their team has viewed the material operations of the Companies for which an investment view has been provided within the past 12 months.

For important disclosures (including copies of historical disclosures) regarding the companies that are the subject of this Citi Research product ("the Product"), please contact Citi Research, 388 Greenwich Street, 6th Floor, New York, NY, 10013, Attention: Legal/Compliance [E6WYB6412478]. In addition, the same important disclosures, with the exception of the Valuation and Risk assessments and historical disclosures, are contained on the Firm's disclosure website at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. Valuation and Risk assessments can be found in the text of the most recent research note/report regarding the subject company. Pursuant to the Market Abuse Regulation a history of all Citi Research recommendations published during the preceding 12-month period can be accessed via Citi Velocity (https://www.citivelocity.com/cv2) or your standard distribution portal. Historical disclosures (for up to the past three years) will be provided upon request.

Citi Research Equity Ratings Distribution

	12 Month Rating			Catalyst Watch		
Data current as of 01 Jul 2026	**Buy**	**Hold**	**Sell**	**Buy**	**Hold**	**Sell**
Citi Research Global Fundamental Coverage (Neutral=Hold)	61%	32%	7%	36%	48%	16%
% of companies in each rating category that are investment banking clients	38%	42%	27%	42%	37%	36%

Guide to Citi Research Fundamental Research Investment Ratings:
Citi Research stock recommendations include an investment rating and an optional risk rating to highlight high risk stocks. **Risk rating** takes into account both price volatility and fundamental criteria. Stocks will either have no risk rating or a High risk rating assigned.
Investment Ratings: Citi Research investment ratings are Buy, Neutral and Sell. Our ratings are a function of analyst expectations of expected total return ("ETR") and risk. ETR is the sum of the forecast price appreciation (or depreciation) plus the dividend yield for a stock within the next 12 months. The target price is based on a 12 month time horizon. The Investment rating definitions are: Buy (1) ETR of 15% or more or 25% or more for High risk stocks; and Sell (3) for negative ETR. Any covered stock not assigned a Buy or a Sell is a Neutral (2). For stocks rated Neutral (2), if an analyst believes that there are insufficient valuation drivers and/or investment catalysts to derive a positive or negative investment view, they may elect with the approval of Citi Research management not to assign a target price and, thus, not derive an ETR. Citi Research may suspend its rating and target price and assign "Rating Suspended" status for regulatory and/or internal policy reasons. Citi Research may also suspend its rating and target price and assign "Under Review" status for other exceptional circumstances (e.g. lack of information critical to the analyst's thesis, trading suspension) affecting the company and/or trading in the company's securities. In both such situations, the rating and target price will show as "—" and "-" respectively in the rating history price chart. Prior to 11 April 2022 Citi Research assigned "Under Review" status to both situations and prior to 11 Nov 2020 only in exceptional circumstances. As soon as practically possible, the analyst will publish a note re-establishing a rating and investment thesis. Investment ratings are determined by the ranges described above at the time of initiation of coverage, a change in investment and/or risk rating, or a change in target price (subject to limited management discretion). At times, the expected total returns may fall outside of these ranges because of market price movements and/or other short-term volatility or trading patterns. Such interim deviations will be permitted but will become subject to review by Research Management. Your decision to buy or sell a security should be based upon your personal investment objectives and should be made only after evaluating the stock's expected performance and risk.

Catalyst Watch/Short Term Views ("STV") Ratings Disclosure:
Catalyst Watch and STV Upside/Downside calls: Citi Research may also include a Catalyst Watch or STV Upside or Downside call to indicate the analyst expects the share price to rise (fall) in absolute terms over a specified period of 30 or 90 days in reaction to one or more specific near-term catalysts or events impacting the company or the market. A Catalyst Watch will be published when Analyst confidence is high that an impact to share price will occur; it will be a STV when confidence level is moderate. A Catalyst Watch or STV Upside/Downside call will automatically expire at the end of the specified 30/90 day period. The Catalyst Watch will also be automatically removed if share price performance (calculated at market close) exceeds 15% against the direction of the call (unless over-ridden by the analyst). The analyst may also remove a Catalyst Watch or STV call prior to the end of the specified period in a published research note. A Catalyst Watch/STV Upside or Downside call may be different from and does not affect a stock's fundamental equity rating, which reflects a longer-term total absolute return expectation. For purposes of FINRA ratings-distribution-disclosure rules, a Catalyst Watch/STV Upside call corresponds to a buy recommendation and a Catalyst Watch/STV Downside call corresponds to a sell recommendation. Any stock not assigned to a Catalyst Watch Upside, Catalyst Watch Downside, STV Upside, or STV Downside call is considered Catalyst Watch/STV No View. For purposes of FINRA ratings distribution-disclosure rules, we correspond Catalyst Watch/STV No View to Hold in our ratings distribution table for our Catalyst Watch/STV Upside/Downside rating system. However, we reiterate that we do not consider No View to be a recommendation. For all Catalyst Watch/STV Upside/Downside calls, risk exists that the catalyst(s) and associated share-price movement will not materialize as expected.

RESEARCH ANALYST AFFILIATIONS / NON-US RESEARCH ANALYST DISCLOSURES
The legal entities employing the authors of this report are listed below (and their regulators are listed further herein). Non-US research analysts who have prepared this report (i.e., all research analysts listed below other than those identified as employed by Citigroup Global Markets Inc.) are not registered/qualified as research analysts with FINRA. Such research analysts may not be associated persons of the member organization (but are employed by an affiliate of the member organization) and therefore may not be subject to the FINRA Rule 2241 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account.

Citigroup Global Markets Taiwan Securities Company Limited	Angela Hsu

OTHER DISCLOSURES

Any price(s) of instruments mentioned in recommendations are as of the prior day's market close on the primary market for the instrument, unless otherwise stated.

The completion and first dissemination of any recommendations made within this research report are as of the Eastern date-time displayed at the top of the Product. If the Product references views of other analysts then please refer to the price chart or rating history table for the date/time of completion and first dissemination with respect to that view.

Regulations in various jurisdictions require that where a recommendation differs from any of the author's previous recommendations concerning the same financial instrument or issuer that has been published during the preceding 12-month period that the change(s) and the date of that previous recommendation are indicated. For fundamental coverage please refer to the price chart or rating change history within this disclosure appendix or the issuer disclosure summary at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.

Citi Research has implemented policies for identifying, considering and managing potential conflicts of interest arising as a result of publication or distribution of investment research. A description of these policies can be found at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.

The proportion of all Citi Research research recommendations that were the equivalent to "Buy","Hold","Sell" at the end of each quarter over the prior 12 months (with the % of these that had received investment firm services from Citi in the prior 12 months shown in brackets) is as follows; Q1 2026 Buy 33%(63%), Hold 44% (52%), Sell 23% (46%), RV 0.5% (89%): Q4 2025 Buy 33% (63%), Hold 44% (50%), Sell 23% (46%), RV 0.4% (91%); Q3 2025 Buy 33% (61%), Hold 44% (52%), Sell 23% (50%), RV 0.4% (80%); Q2 2025 Buy 33%(63%), Hold 44% (51%), Sell 23% (49%), RV 0.4% (86%). For the purposes of disclosing recommendations other than for equity (whose definitions can be found in the corresponding disclosure sections), "Buy" means a positive directional trade idea; "Sell" means a negative directional trade idea; and "Relative Value" means any trade idea which does not have a clear direction to the investment strategy.

European regulations require a 5 year price history when past performance of a security is referenced. CitiVelocity's Charting Tool (https://www.citivelocity.com/cv2/#go/CHARTING_3_Equities) provides the facility to create customisable price charts including a five year option. This tool can be found in the Data & Analytics section under any of the asset class menus in CitiVelocity (https://www.citivelocity.com/). For further information contact CitiVelocity support (https://www.citivelocity.com/cv2/go/CLIENT_SUPPORT). The source for all referenced prices, unless otherwise stated, is DataCentral, which sources price information from LSEG Data & Analytics. Past performance is not a guarantee or reliable indicator of future results. Forecasts are not a guarantee or reliable indicator of future performance.

Investors should always consider the investment objectives, risks, and charges and expenses of an ETF carefully before investing. The applicable prospectus and key investor information document (as applicable) for an ETF should contain this and other information about such ETF. It is important to read carefully any such prospectus before investing. Clients may obtain prospectuses and key investor information documents for ETFs from the applicable distributor or authorized participant, the exchange upon which an ETF is listed and/or from the applicable website of the applicable ETF issuer. The value of the investments and any accruing income may fall or rise. Any past performance, prediction or forecast is not indicative of future or likely performance. Any information on ETFs contained herein is provided strictly for illustrative purposes and should not be deemed an offer to sell or a solicitation of an offer to purchase units of any ETF either explicitly or implicitly. The opinions expressed are those of the authors and do not necessarily reflect the views of ETF issuers, any of their agents or their affiliates.

Citigroup Global Markets India Private Limited and/or its affiliates may have, from time to time, actual or beneficial ownership of 1% or more in the debt securities of the subject issuer.

Please be advised that pursuant to Executive Order 13959 as amended (the “Order”), U.S. persons are prohibited from investing in securities of any company determined by the United States Government to be the subject of the Order. This research is not intended to be used or relied upon in any way that could result in a violation of the Order. Investors are encouraged to rely upon their own legal counsel for advice on compliance with the Order and other economic sanctions programs administered and enforced by the Office of Foreign Assets Control of the U.S. Treasury Department.

This communication is directed at persons who are "Eligible Clients" as such term is defined in the Israeli Regulation of Investment Advice, Investment Marketing and Investment Portfolio Management law, 1995 (the "Advisory Law"). Within Israel, this communication is not intended for retail clients and Citi will not make such products or transactions available to retail clients or to non-Eligible Clients. The presenter is not licensed as investment advisor or investment marketer by the Israeli Securities Authority (“ISA”) and this communication does not constitute investment or marketing advice. The information contained herein may relate to matters that are not regulated by the ISA. Any securities which are the subject of this communication may not be offered or sold to any Israeli person except pursuant to a security offering exemption according to the Israeli Securities Law, 1968and the public offering rules provided thereunder.

Citi Research broadly and simultaneously disseminates its research content to the Firm’s institutional and retail clients via the Firm’s proprietary electronic distribution platforms (e.g., Citi Velocity and various Global Wealth platforms). As a convenience, certain, but not all, research content may be distributed through third party aggregators. Clients may receive published research reports by email, on a discretionary basis, and only after such research content has been broadly disseminated. Certain research is made available only to institutional investors to satisfy regulatory requirements. The level and types of services provided by Citi Research analysts to clients may vary depending on various factors such as the client’s individual preferences as to the frequency and manner of receiving communications from analysts, the client’s risk profile and investment focus and perspective (e.g. market-wide, sector specific, long term, short-term etc.), the size and scope of the overall client relationship with the Firm and legal and regulatory constraints.

Pursuant to Comissão de Valores Mobiliários Resolução 20 and ASIC Regulatory Guide 264, Citi is required to disclose whether a Citi related company or business has a commercial relationship with the subject company. Considering that Citi operates multiple businesses in more than 100 countries around the world, it is likely that Citi has a commercial relationship with the subject company.

Securities recommended, offered, or sold by the Firm: (i) are not insured by the Federal Deposit Insurance Corporation; (ii) are not deposits or other obligations of any insured depository institution (including Citibank); and (iii) are subject to investment risks, including the possible loss of the principal amount invested. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security. Any decision to purchase securities mentioned in the Product must take into account existing public information on such security or any registered prospectus. Although information has been obtained from and is based upon sources that the Firm believes to be reliable, we do not guarantee its accuracy and it may be incomplete and condensed. Note, however, that the Firm has taken all reasonable steps to determine the accuracy and completeness of the disclosures made in the Important Disclosures section of the Product. The Firm's research department has received assistance from the subject company(ies) referred to in this Product including, but not limited to, discussions with management of the subject company(ies). Firm policy prohibits research analysts from sending draft research to subject companies. However, it should be presumed that the author of the Product has had discussions with the subject company to ensure factual accuracy prior to publication. Statements and views concerning ESG (environmental, social, governance) factors are typically based upon public statements made by the affected company or other public news, which the author may not have independently verified. ESG factors are one consideration that investors may choose to examine when making investment decisions. All opinions, projections and estimates constitute the judgment of the author as of the date of the Product and these, plus any other information contained in the Product, are subject to change without notice. Prices and availability of financial instruments also are subject to change without notice. Notwithstanding other departments within the Firm advising the companies discussed in this Product, information obtained in such role is not used in the preparation of the Product. Although Citi Research does not set a predetermined frequency for publication, if the Product is a fundamental equity or credit research report, it is the intention of Citi Research to provide research coverage of the covered issuers, including in response to news affecting the issuer. For non-fundamental research reports, Citi Research may not provide regular updates to the views, recommendations and facts included in the reports. Notwithstanding that Citi Research maintains coverage on, makes recommendations concerning or discusses issuers, Citi Research may be periodically restricted from referencing certain issuers due to legal or policy reasons. Where a component of a published trade idea is subject to a restriction, the trade idea will be removed from any list of open trade ideas included in the Product. Upon the lifting of the restriction, the trade idea will either be re-instated in the open trade ideas list if the analyst continues to support it or it will be officially closed. Citi Research may provide different research products and services to different classes of customers (for example, based upon long-term or short-term investment horizons) that may lead to differing conclusions or recommendations that could impact the price of a security contrary to the recommendations in the alternative research product, provided that each is consistent with the rating system for each respective product.

Investing in non-U.S. securities, including ADRs, may entail certain risks. The securities of non-U.S. issuers may not be registered with, nor be subject to the reporting requirements of the U.S. Securities and Exchange Commission. There may be limited information available on foreign securities. Foreign companies are generally not subject to uniform audit and reporting standards, practices and requirements comparable to those in the U.S. Securities of some foreign companies may be less liquid and their prices more volatile than securities of comparable U.S. companies. In addition, exchange rate movements may have an adverse effect on the value of an investment in a foreign stock and its corresponding dividend payment for U.S. investors. Net dividends to ADR investors are estimated, using withholding tax rates conventions, deemed accurate, but investors are urged to consult their tax advisor for exact dividend computations. Investors who have received the Product from the Firm may be prohibited in certain states or other jurisdictions from purchasing securities mentioned in the Product from the Firm. Please ask your Financial Consultant for additional details. Citigroup Global Markets Inc. takes responsibility for the Product in the United States. Any orders by US investors resulting from the information contained in the Product may be placed only through Citigroup Global Markets Inc.

The Citigroup legal entity that takes responsibility for the production of the Product is the legal entity which the first named author is employed by.

The Product is made available in **Australia** through Citigroup Global Markets Australia Pty Limited. (ABN 64 003 114 832 and AFSL No. 240992), participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. Citigroup Global Markets Australia Pty Limited is not an Authorised Deposit-Taking Institution under the Banking Act 1959, nor is it regulated by the Australian Prudential Regulation Authority.

The Product is made available in **Brazil** by Citigroup Global Markets Brasil - CCTVM SA, which is regulated by CVM - Comissão de Valores Mobiliários ("CVM"), BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBIMA – Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais. Av. Paulista, 1111 - 14º andar(parte) - CEP: 01311920 - São Paulo - SP.

This Product is available in **Chile** through Banchile Corredores de Bolsa S.A., an indirect subsidiary of Citigroup Inc., which is regulated by the Comisión Para El Mercado Financiero. Enrique Foster Sur, 20, piso 6, Las Condes, Santiago, Chile.

Disclosure for investors in the Republic of Colombia :This communication or message does not constitute a professional recommendation to make investment in the terms of article 2.40.1.1.2 of Decree 2555 de 2010 or the regulations that modify, substitute or complement it. Para la elaboración y distribución de informes de investigación y de comunicaciones generales de que trata este artículo no se requiere ser una entidad vigilada por la Superintendencia Financiera de Colombia.

The Product is made available in **Germany** by Citigroup Global Markets Europe AG ("CGME"), which is regulated by the European Central Bank and the German Federal Financial Supervisory Authority (Bundesanstalt fur Finanzdienstleistungsaufsicht BaFin). Börsenplatz 9, 60313 Frankfurt am Main, Germany.

Unless otherwise specified, if the analyst who prepared this report is based in Hong Kong and it relates to “securities” (as defined in the Securities and Futures Ordinance (Cap.571 of the Laws of Hong Kong)), the report is issued in Hong Kong by Citigroup Global Markets Asia Limited. Citigroup Global Markets Asia Limited is regulated by Hong Kong Securities and Futures Commission. If the report is prepared by a non-Hong Kong based analyst, please note that such analyst (and the legal entity that the analyst is employed by or accredited to) is not licensed/registered in Hong Kong and they do not hold themselves out as such. Please refer to the section “Research Analyst Affiliations / Non-US Research Analyst Disclosures” for the details of the employment entity of the analysts.

The Product is made available in **India** by Citigroup Global Markets India Private Limited (CGM), which is regulated by the Securities and Exchange Board of India (SEBI), as a Research Analyst (SEBI Registration No. INH000000438). CGM is also actively involved in the business of merchant banking (SEBI Registration No. INM000010718) and stock brokerage ((SEBI Registration No. INZ000263033) in India, and is registered with SEBI in this regard. Registration granted by SEBI, enlistment with Bombay Stock Exchange (BSE) and certification from National Institute of Securities Markets (NISM) in no way guarantee performance of the intermediary or provide any assurance of returns to investors. CGM’s registered office is at 1202, 12th Floor, First International Financial Centre (FIFC), G Block, Bandra Kurla Complex, Bandra East, Mumbai – 400098 & registered Tel: +91 22 61759999. Citi maintains robust policies, procedures,controls, and training to ensure continued compliance with all applicable rulesand regulations. All recommendations contained herein are made by dulyqualified research analysts. CGM’s Corporate Identity Number is U99999MH2000PTC126657, and its Compliance Officer [Vishal Bohra] contact details are: Tel:+91-022-61759994, Fax:+91-022-61759851, Email: cgmcompliance@citi.com. The Investor Charter in respect of Research Analysts, the Compliance Audit Report and Complaints information can be found at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. The grievance officer [Niraj Mody] contact details are Tel: +91-22-42775002, Email: EMEA.CR.Complaints@citi.com. Investment in securities market are subject to market risks. Read all the related documents carefully before investing. SEBI prescribed Client Terms & Conditions can be found at https://www.citivelocity.com/rendition/authfilelinksvcs/eppublic/V1/file?paramData=ZmlsZU5hbWU9L1MzL0dETVMvcHViRGlzY2xvc3VyZUh0bWxzL2dkbV9kaXNfc2ViaV9UZXJtc29mVXNlLmh0bWw

The Product is made available in **Indonesia** through PT Citigroup Sekuritas Indonesia. Citibank Tower 10/F, Pacific Century Place, SCBD lot 10, Jl. Jend Sudirman Kav 52-53, Jakarta 12190, Indonesia. Neither this Product nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable capital market laws and regulations. This Product is not an offer of securities in Indonesia. The securities referred to in this Product have not been registered with the Capital Market and Financial Services Authority (OJK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market laws and regulations.

The Product is made available in **Japan** by Citigroup Global Markets Japan Inc. ("CGMJ"), which is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Otemachi Park Building, 1-1-1 Otemachi, Chiyoda-ku, Tokyo 100-8132 Japan. In the event that an error is found in an CGMJ research report, a revised version will be posted on the Firm's Citi Velocity website. If you have questions regarding Citi Velocity, please call (81 3) 6270-3019 for help.

The product is made available in the **Kingdom of Saudi Arabia** in accordance with Saudi laws through Citigroup Saudi Arabia, which is regulated by the Capital Market Authority (CMA) under CMA license (17184-31). 2239 Al Urubah Rd – Al Olaya Dist. Unit No. 18, Riyadh 12214 – 9597, Kingdom Of Saudi Arabia.

The Product is made available in **Korea** by Citigroup Global Markets Korea Securities Ltd. (CGMK), which is regulated by the Financial Services Commission, the Financial Supervisory Service and the Korea Financial Investment Association (KOFIA). The address of CGMK is Citibank Center, 50 Saemunan-ro, Jongno-gu, Seoul 03184, Korea. KOFIA makes available registration information of research analysts on its website. Please visit the following website if you wish to find KOFIA registration information on research analysts of CGMK. http://dis.kofia.or.kr/websquare/index.jsp?w2xPath=/wq/fundMgr/DISFundMgrAnalystList.xml&divisionId=MDIS03002002000000&serviceId=SDIS03002002000. The Product is made available in Korea by Citibank Korea Inc., which is regulated by the Financial Services Commission and the Financial Supervisory Service. Address is Citibank Center, 50 Saemunan-ro, Jongno-gu, Seoul 03184, Korea. This research report is intended to be provided only to Professional Investors as defined in the Financial Investment Services and Capital Market Act and its Enforcement Decree in Korea.

The Product is made available in **Malaysia** by Citigroup Global Markets Malaysia Sdn Bhd (Registration No. 199801004692 (460819-D)) (“CGMM”) to its clients and CGMM takes responsibility for its contents as regards CGMM’s clients. CGMM is regulated by the Securities Commission Malaysia. Please contact CGMM at Level 43 Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia in respect of any matters arising from, or in connection with, the Product.

The Product is made available in **Mexico** by Citi México Casa de Bolsa, S.A. de C.V., Grupo Financiero Citi México which is a wholly owned subsidiary of Citigroup Inc. and is regulated by Comision Nacional Bancaria y de Valores. Prolongación Reforma 1196, 24 floor, Colonia Santa Fe, Alcaldía Cuajimalpa de Morelos, C.P. 05348, Ciudad de México.

The Product is made available in **Poland** by Biuro Maklerskie Banku Handlowego (DMBH), separate department of Bank Handlowy w Warszawie S.A. a subsidiary of Citigroup Inc., which is regulated by Komisja Nadzoru Finansowego. Biuro Maklerskie Banku Handlowego (DMBH), ul.Senatorska 16, 00-923 Warszawa.

The Product is made available in **Singapore** through Citigroup Global Markets Singapore Pte. Ltd. (“CGMSPL”), a capital markets services and Exempt Financial Advisor license holder, and regulated by Monetary Authority of Singapore. Please contact CGMSPL at 8 Marina View, 21st Floor Asia Square Tower 1, Singapore 018960, in respect of any matters arising from, or in connection with, the analysis of this document. This Product is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act 2001. For Citi Private Bank, the Product is made available in Singapore by Citi Private Bank through Citibank, N.A., Singapore Branch. Citibank N.A., Singapore Branch is a licensed bank in Singapore that is regulated by the Monetary Authority of Singapore. Please contact your Private Banker in Citibank N.A., Singapore Branch if you have any queries on or any matters arising from or in connection with this document. The Product is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act 2001. For Citibank Singapore Limited (“CSL”), the Product is distributed in Singapore by CSL to selected Citigold/Citigold Private Clients. CSL provides no independent research or analysis of the substance or in preparation of the Product. Please contact your Citigold//Citigold Private Client Relationship Manager in CSL if you have any queries on or any matters arising from or in connection with this document. The Product is intended for recipients who are accredited investors as defined under the Securities and Futures Act (Cap. 289).

Citigroup Global Markets (Pty) Ltd. is incorporated in the **Republic of South Africa** (company registration number 2000/025866/07) and its registered office is at 145 West Street, Sandton, 2196, Saxonwold. Citigroup Global Markets (Pty) Ltd. is regulated by JSE Securities Exchange South Africa, South African Reserve Bank and the Financial Services Board. The investments and services contained herein are not available to private customers in South Africa.

The Product is made available in the **Republic of China (Taiwan)** through Citigroup Global Markets Taiwan Securities Company Ltd. ("CGMTS"), 14F, 15F and 16F, No. 1, Songzhi Road, Taipei 110, Taiwan, subject to the license scope and the applicable laws and regulations in the Republic of China (Taiwan). CGMTS is regulated by the Securities and Futures Bureau of the Financial Supervisory Commission of Taiwan, the Republic of China (Taiwan). No portion of the Product may be reproduced or quoted in the Republic of China (Taiwan) by the press or any third parties [without the written authorization of CGMTS]. Pursuant to the applicable laws and regulations in the Republic of China (Taiwan), the recipient of the Product shall not take advantage of such Product to involve in any matters in which the recipient may have conflicts of interest. If the Product covers securities which are not allowed to be offered or traded in the Republic of China (Taiwan), neither the Product nor any information contained in the Product shall be considered as advertising the securities or making recommendation of the securities in the Republic of China (Taiwan). The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security or financial products. Any decision to purchase securities or financial products mentioned in the Product must take into account existing public information on such security or the financial products or any registered prospectus.

The Product is made available in **Thailand** through Citicorp Securities (Thailand) Ltd., which is regulated by the Securities and Exchange Commission of Thailand. 399 Interchange 21 Building, 18th Floor, Sukhumvit Road, Klongtoey Nua, Wattana ,Bangkok 10110, Thailand.

Disclosure for investors in the Republic of Turkey: The Product is made available in **Turkey** through Citibank AS which is regulated by Capital Markets Board. Tekfen Tower, Eski Buyukdere Caddesi # 209 Kat 2B, 23294 Levent, Istanbul, Turkey. Under Capital Markets Law of Turkey (Law No: 6362), the investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Comments and recommendations stated here rely on the individual opinions of the ones providing these comments and recommendations. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations. Furthermore, Citi Research is a division of Citigroup Global Markets Inc. (the "Firm"), which does and seeks to do business with companies and/or trades on securities covered in this research reports. As a result, investors should be aware that the Firm may have a conflict of interest that could affect the objectivity of this report, however investors should also note that the Firm has in place organisational and administrative arrangements to manage potential conflicts of interest of this nature.

In the **U.A.E**, these materials (the "Materials") are communicated byCitigroup Global Markets Limited, DIFC branch ("CGML"), an entityregistered in the Dubai International Financial Center ("DIFC") andlicensed and regulated by the Dubai Financial Services Authority ("DFSA",license #CL0221) to Professional Clients and Market Counterparties, as definedin DFSA regulations, only and should not be relied upon or distributed toRetail Clients. Financial products and/or services to which the Materialsrelate will only be made available to Professional Clients and MarketCounterparties. Citigroup Global Markets Limited DIFC Branch registered addressis Level 3, Gate District Building 02, Dubai International Financial Centre andcan be contacted on +971 4 509 97 90.

The Product is made available in **United Kingdom** by Citigroup Global Markets Limited, which is authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA. This material may relate to investments or services of a person outside of the UK or to other matters which are not authorised by the PRA nor regulated by the FCA and the PRA and further details as to where this may be the case are available upon request in respect of this material. Citigroup Centre, Canada Square, Canary Wharf, London, E14 5LB.

The Product is made available in **United States** and **Canada** by Citigroup Global Markets Inc., which is a member of FINRA and registered with the US Securities and Exchange Commission. 388 Greenwich Street, New York, NY 10013.

Unless specified to the contrary, within EU Member States, the Product is made available by Citigroup Global Markets Europe AG ("CGME"), which is regulated by the European Central Bank and the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht-BaFin).

The Product is not to be construed as providing investment services in any jurisdiction where the provision of such services would not be permitted.
Subject to the nature and contents of the Product, the investments described therein are subject to fluctuations in price and/or value and investors may get back less than originally invested. Certain high-volatility investments can be subject to sudden and large falls in value that could equal or exceed the amount invested.The yield and average life of CMOs (collateralized mortgage obligations) referenced in this Product will fluctuate depending on the actual rate at which mortgage holders prepay the mortgages underlying the CMO and changes in current interest rates. Any government agency backing of the CMO applies only to the face value of the CMO and not to any premium paid. Certain investments contained in the Product may have tax implications for private customers whereby levels and basis of taxation may be subject to change. If in doubt, investors should seek advice from a tax adviser. The Product does not purport to identify the nature of the specific market or other risks associated with a particular transaction. Advice in the Product is general and should not be construed as personal advice given it has been prepared without taking account of the objectives, financial situation or needs of any particular investor. Accordingly, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to their objectives, financial situation and needs. Prior to acquiring any financial product, it is the client's responsibility to obtain the relevant offer document for the product and consider it before making a decision as to whether to purchase the product.

Card Insights. Where this report references Card Insights data, Card Insights consists of selected data from a subset of Citi's proprietary credit card transactions. Such data has undergone rigorous security protocols to keep all customer information confidential and secure; the data is highly aggregated and anonymized so that all unique customer identifiable information is removed from the data prior to receipt by the report's author or distribution to external parties. This data should be considered in the context of other economic indicators and publicly available information. Further, the selected data represents only a subset of Citi's proprietary credit card transactions due to the selection methodology or other limitations and should not be considered as indicative or predictive of the past or future financial performance of Citi or its credit card business.

Citi Research product may source data from dataCentral. dataCentral is a Citi Research proprietary database, which includes the Firm's estimates, data from company reports and feeds from LSEG Data & Analytics. The source for all referenced prices, unless otherwise stated, is DataCentral. Past performance is not a guarantee or reliable indicator of future results. Forecasts are not a guarantee or reliable indicator of future performance. The printed and printable version of the research report may not include all the information <(e.g. certain financial summary information and comparable company data) that is linked to the online version available on the Firm's proprietary electronic distribution platforms.
Where included in this report, MSCI sourced information is the exclusive property of Morgan Stanley Capital International Inc. (MSCI). Without prior written permission of MSCI, this information and any other MSCI intellectual property may not be reproduced, redisseminated or used to create any financial products, including any indices. This information is provided on an "as is" basis. The user assumes the entire risk of any use made of this information. MSCI, its affiliates and any third party involved in, or related to, computing or compiling the information hereby expressly disclaim all warranties of originality,