



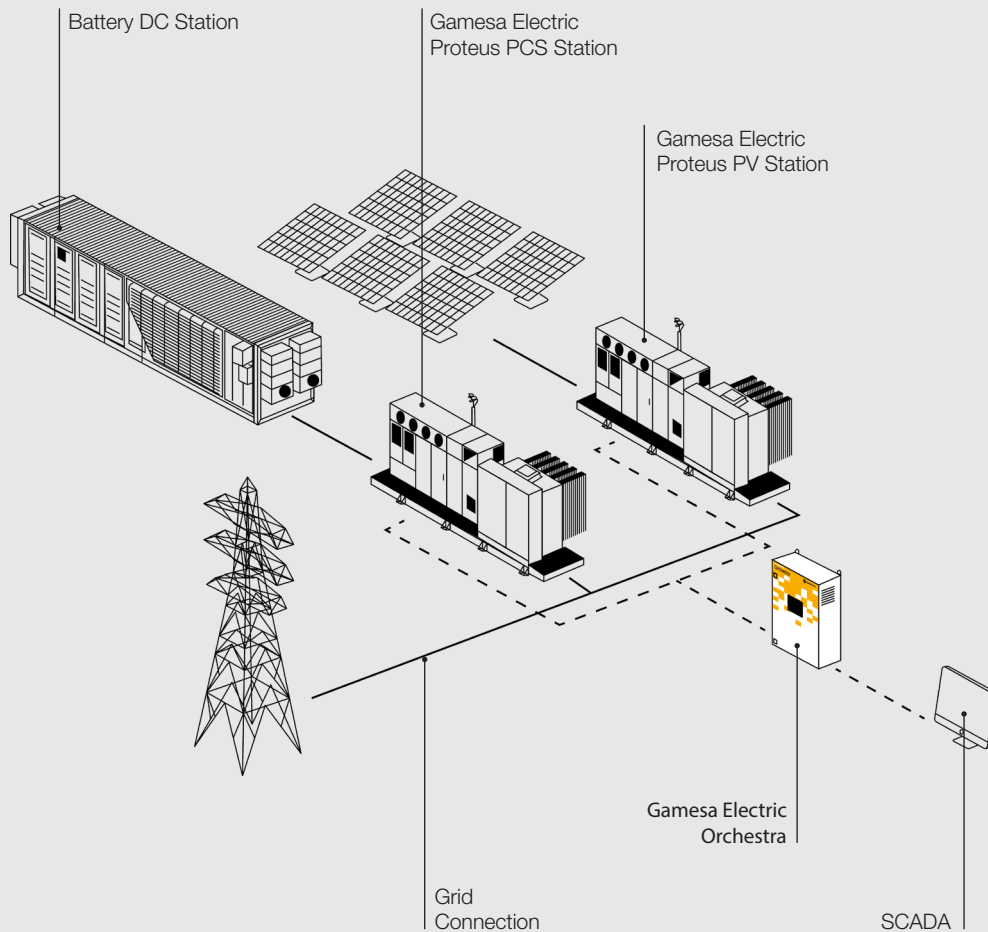
GamesaElectric



Gamesa Electric Orchestra

Power Plant Controller
for PV and Storage





Gamesa Electric Orchestra

Power Plant Controller for PV & BESS



Broad & flexible functionality

Flexible plant configuration:

- Photovoltaic generation
- BESS stand alone
- Hybrid solar + storage

Multiple applications:

Fast frequency response (FFR), voltage regulation, active/reactive power control, ramp-rate, power oscillation damping (POD)...

Local and remote control and monitoring compatible with different users: plant operator, grid operator, plant owner, service team



Grid connection robustness

Extensive grid code knowledge based on wind, solar and BESS experience in more than 54 countries.

Grid code compliance proven in the most demanding markets including Europe, Australia, Mexico, USA and others

Advance functionalities as optional: Grid forming based on VSM algorithms (on-grid and off-grid modes), black start, synchronization of grids, support of external grid outage.

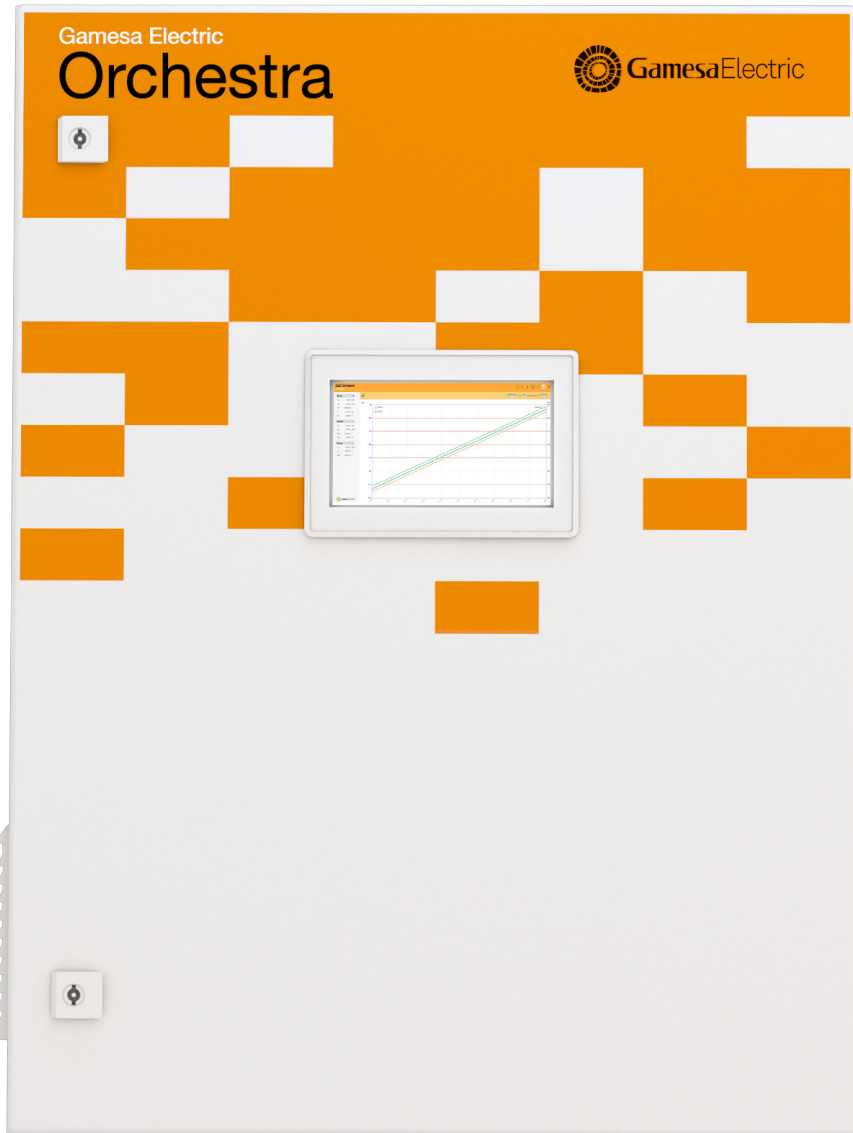


Scalability and connectivity

Scalability from small to large utility scale projects

Multi-PCS and multi-PV inverter coordination for maximum performance. Optimized state of charge (SOC) recovery algorithms

High communication speed and connectivity capacity, fast plant response.



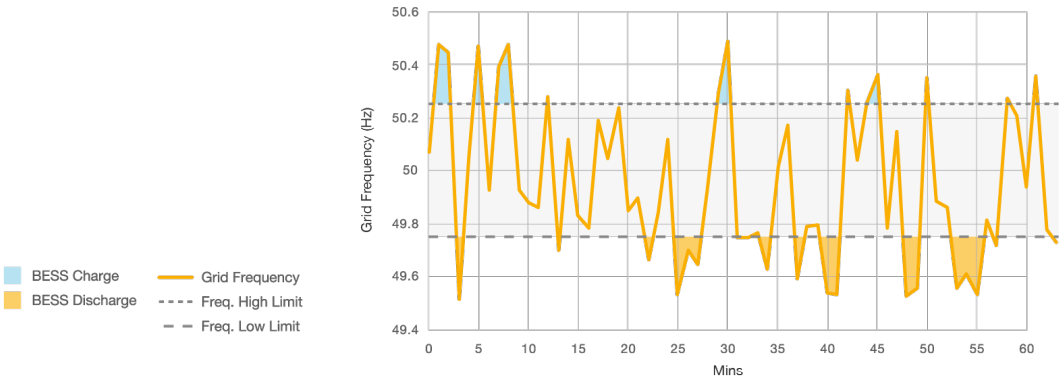
Gamesa Electric Orchestra brings intelligence to the PV & storage system optimising resources and maximising performance.

Gamesa Electric Orchestra Functionalities & Applications

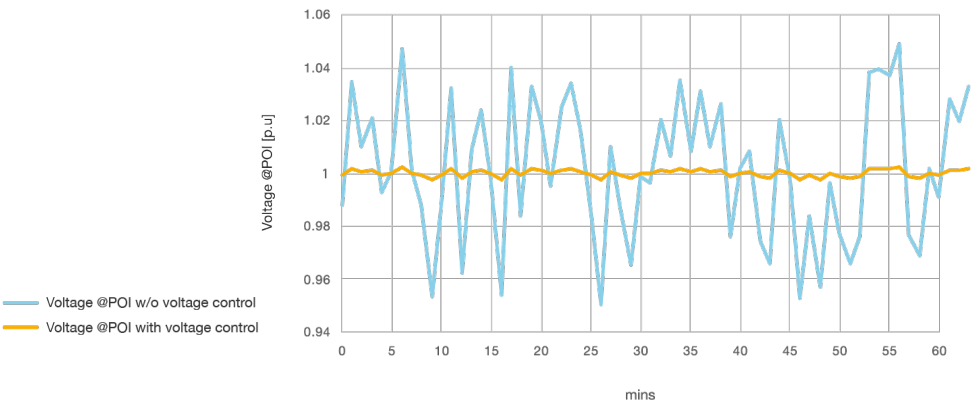
Power Quality

	PV Plant	BESS Stand alone	Hybrid PV + BESS
Grid code compliance	✓	✓	✓
Primary frequency response (P-f droop)	✓	✓	✓
Synthetic Inertia	✓	✓	✓
Voltage control	✓	✓	✓
Power factor, reactive power control	✓	✓	✓
Ramp rate (active/reactive power)	✓	✓	✓
Power oscilation damping (POD)	✓	✓	✓
Q-V droop, P-V droop	✓	✓	✓
Q-P droop, PF-P droop	✓	✓	✓

Frequency control



Voltage Control



Gamesa Electric Orchestra Functionalities & Applications

Energy management ⁽¹⁾

	PV Plant	BESS Stand alone	Hybrid PV + BESS
External P, Q set-points	✓	✓	✓
Secondary and tertiary response	✓	✓	✓
Energy arbitrage (trading)		✓	✓
Peak shaving (load shedding)		✓	✓
PV Energy Shifting			✓
Plant Curtailment	✓	✓	✓

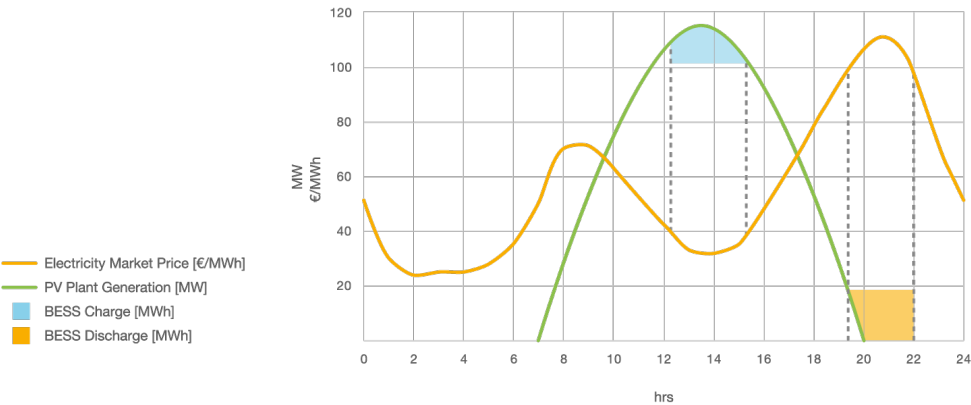
⁽¹⁾ Energy Management Functionalities executed through an external P/Q reference

Advanced functionalities

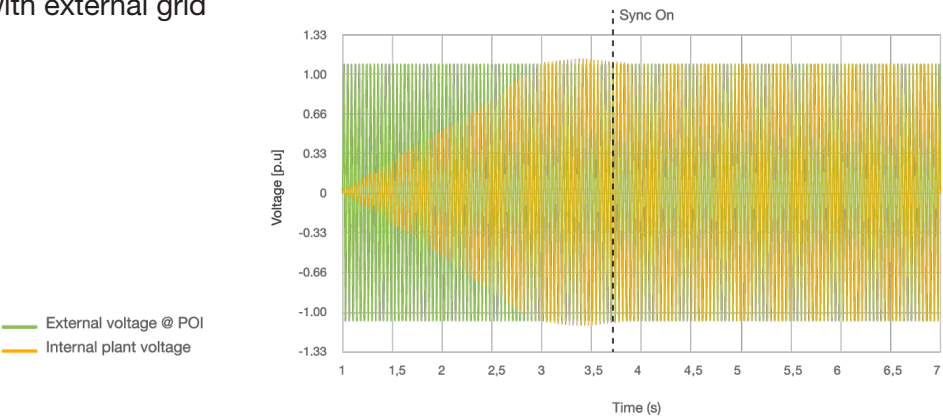
	PV Plant	BESS Stand alone	Hybrid PV + BESS
Grid forming (off-grid mode)		✓	✓
Black Start		✓	✓
Grid forming (on-grid mode)		✓	✓
Synchronization internal/external grid		✓	✓

⁽¹⁾ Consult Gamesa electric for advance functionalities in PV plants without batteries.

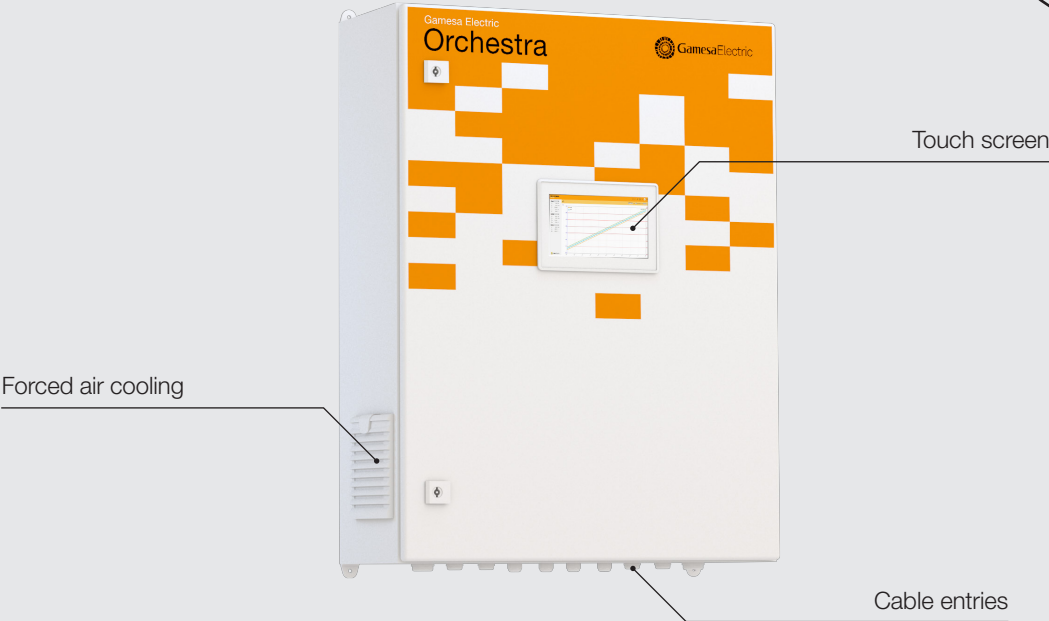
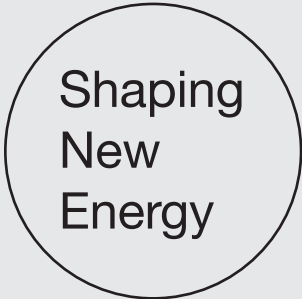
PV Energy Shifting



Black start / grid forming / Synchronization with external grid



Gamesa Electric Orchestra Specifications



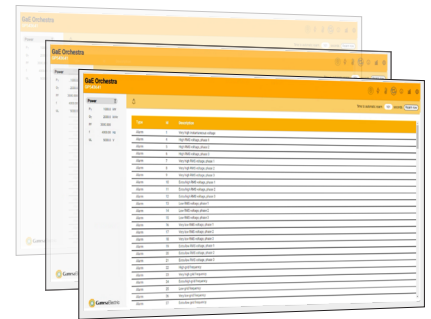
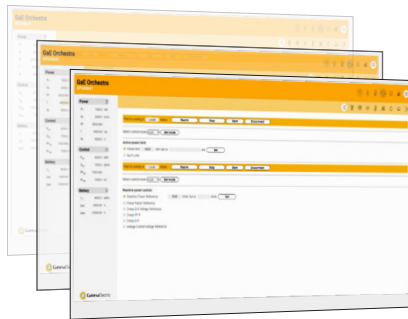
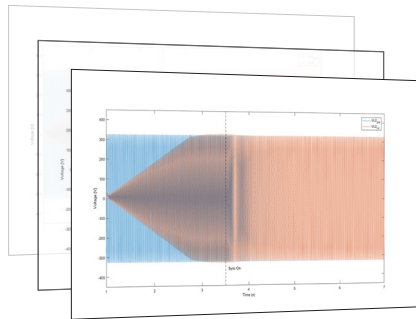
General Data	
Plant Configuration ⁽¹⁾	Photovoltaic / BESS Standalone / Hybrid PV + BESS
Inverter Compatibility	Gamesa Electric Proteus Series
Main characteristics	
Dimensions (H / W / D)	800 x 600 x 300 mm [31.5 x 23.6 x 11.8 inch]
Weight	45 kg [99.2 lb]
Standard Protection Class ⁽¹⁾	IP20
Power Supply ⁽¹⁾	250W, 1ph, 230Vac 50/60Hz
Cooling	Forced air
Mounting System ⁽¹⁾	Wall / Support structure mounted
Certification ⁽²⁾	CE Marking
Environmental Conditions	
Temperature Range – Operation ⁽¹⁾	0°C / +60°C [32°F / 140°F]
Relative Humidity	5 – 95% (non-condensing)
Maximum Altitude ⁽¹⁾	2000 m
Corrosion Protection ⁽¹⁾	C4
Grid Metering	
Integrated Direct Analog Readings ⁽³⁾	3 x CTs and 3 x VTs
Grid Analyzer	Optional
Communications	
Power Converters	Modbus TCP/IP
SCADA ⁽¹⁾	Modbus TCP/IP
Grid Operator ⁽¹⁾	Modbus TCP/IP
Webserver	Included
Optionals	
Grid Analyzer	
Touch screen	
Auxiliary power supply at +24V	
Low Temperature Kit up to -20 °C [-4 °F]	
High Altitude Kit up to 4,000 [13,123 ft]	
Protection Against High Corrosion C5	
Power Supply Kit 250W, 120Vac, 1ph, 50/60Hz	
Cold Swap Redundancy	

⁽¹⁾ Consult Gamesa Electric for a specific configuration

⁽²⁾ Consult Gamesa Electric for different Standards/Directives

⁽³⁾ Optimum for solutions where Orchestra is located in a near proximity of the POI measurement (<10 m [32.8 ft])

Gamesa Electric Orchestra Additional Services



Grid Code Analysis Support

- Grid code analysis by project
- Grid integration, grid impact and Grid Performance Standards (GPS) support
- PSS/E, PSCAD and DigSILENT models available upon request
- Certification of grid codes with HIL (hardware in loop)



Data Monitoring

- Plant performance at POI
- Battery performance
- Local & cloud based options
- Webserver



External Control and Monitoring Interfaces

- Customer Control Centre
- O&M Support Centre
- Grid Operator / Dispatch Centre
- Asset Operator
- System Aggregator / Bidding Operator



GamesaElectric

Shaping New Energy



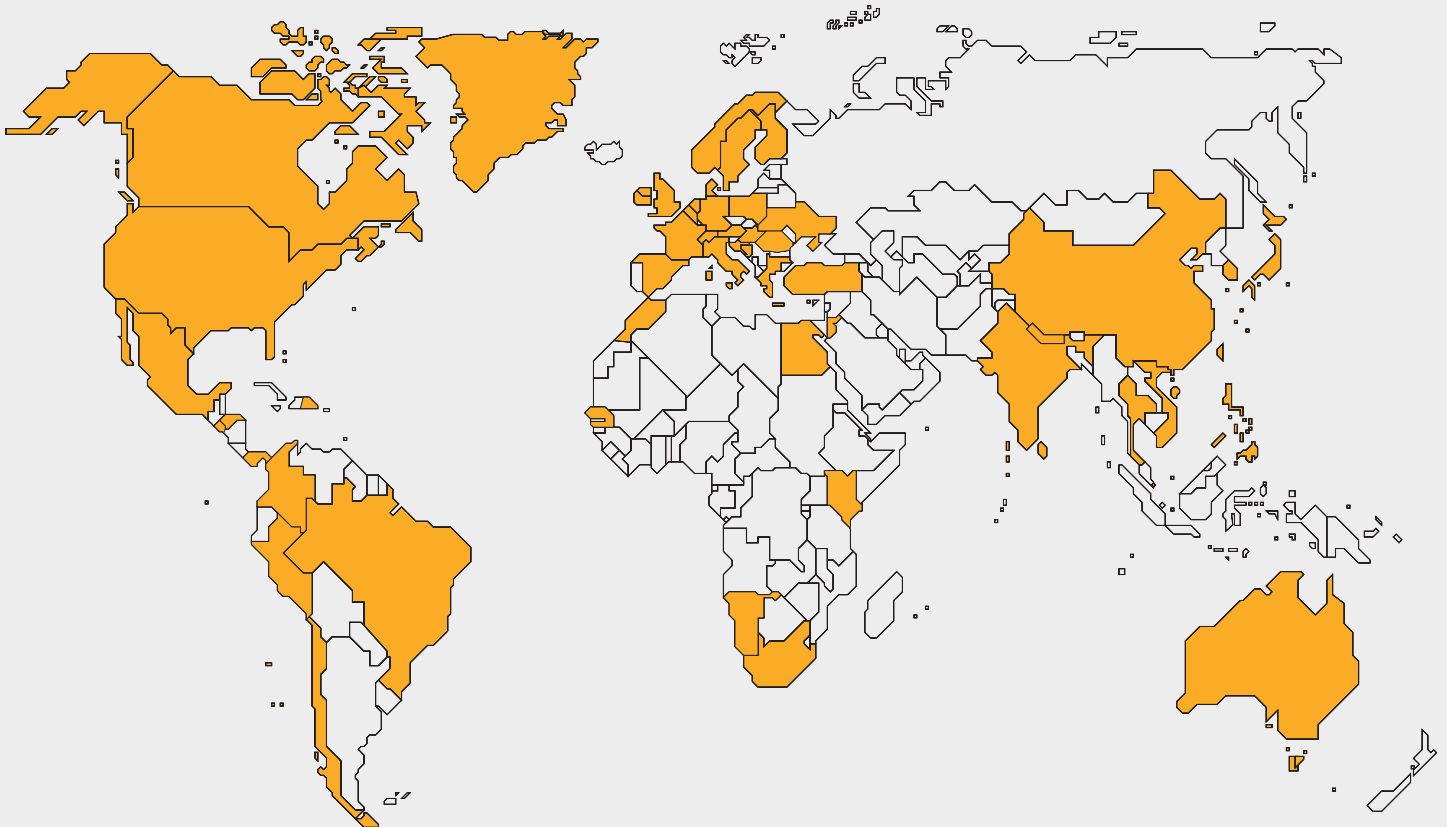
+7 GW SOLAR &
STORAGE ENERGY



+134 GW
WIND POWER



+90
COUNTRIES



**Worldwide
presence**

Australia
Austria
Belgium
Bosnia and
Herzegovina
Brazil
Bulgaria
Canada

Chile
China
Colombia
Croatia
Denmark
Dominican Rep.
Egypt
El Salvador

Finland
France
Germany
Greece
Honduras
Hong Kong
Hungary
India

Ireland
Italy
Japan
Jordan
Kenya
Korea
Mexico
Morocco

Namibia
Netherlands
Norway
Panama
Peru
Philippines
Poland
Senegal

Singapore
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Thailand
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gamesaelectric@gamesacorp.com
www.gamesaelectric.com

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April 2024