

Introduction of COSTIME for information release

What COSTIME does

COSTIME is an AI-assisted software platform that helps people understand how a battery technology could be designed, manufactured, supplied, commercialized, and what it would cost. The name COSTIME combines “COST” and “TIME”. The logo is designed from cent ¢.



A new battery technology may perform very well in a laboratory, but that does not necessarily mean it can be manufactured economically at large scale. Before companies or government programs invest heavily in a technology, they need answers to questions such as: How many cells are needed for an electric vehicle? What materials are required? How large would the factory need to be? How much would the materials, labor, equipment, utilities, and factory operations cost? What's the impact of labor and manufacturing economics after introducing humanoid robotics? Where do the critical materials come from? And how long might it take before technology can realistically reach the market?

COSTIME brings these questions together in one software environment. Instead of requiring separate specialists and separate models for battery design, manufacturing, cost, supply chain, and commercialization, COSTIME connects these analyses into a common workflow:

Battery Design → Materials → Manufacturing → Cost → Supply Chain →
Commercialization

The software supports established technologies such as lithium-ion batteries as well as emerging technologies such as lithium-metal, sodium-ion, and solid-state batteries. It can analyze batteries for electric vehicles and large stationary energy-storage systems.

For users who are not battery-design experts, an AI-assisted design function can also generate reasonable starting parameters, allowing them to evaluate a technology without first performing a detailed professional cell, module, and pack design.

Examples of COSTIME outputs

The output is not simply one number such as "\$100/kWh." COSTIME produces a collection of engineering, manufacturing, economic, and supply-chain results that explain why a battery has a particular cost and what could change that cost. Some software snapshots can be seen in final section.

Analysis	Example of what COSTIME can produce
EV battery design	More than 1,000 possible battery-pack configurations , including cell arrangement, module configuration, pack dimensions, energy, voltage, cell count, weight, and interactive 3D visualization
Grid energy storage	Designs for 40-foot battery containers , showing cells, packs, racks, system voltage, energy capacity, and physical arrangement
Bill of materials	Detailed quantities of cathode, anode, electrolyte, separator, current collectors, housing, pack components, and other materials required to manufacture the battery
Material prices	Current material-price information collected with the COSTIME AI DataMiner , together with price trends and projections
Manufacturing plant	A model of a modern battery factory, including individual manufacturing zones, equipment, workforce, material flow, utilities, HVAC/dry-room requirements, yield, maintenance, and other operating requirements
Cost analysis	Breakdown of direct materials, direct labor, manufacturing overhead, SG&A, R&D, and profit , along with sensitivity analysis and future cost projections
Supply chain	Tracking of a battery material backward through suppliers and processing steps toward upstream minerals , together with supply-risk and critical-material information
Commercialization	Assessment of the maturity of an emerging technology and an estimated pathway or timeline toward commercial-scale production
Smart manufacturing	Evaluation of humanoid robotics and its effect on factory operation and cost

For example, someone evaluating a new lithium-metal battery could enter its performance characteristics into COSTIME. The software could first design an EV battery pack around that cell, determine how many cells and materials are required,

construct a corresponding manufacturing scenario, calculate its production cost, identify important materials and supply-chain risks, and then examine whether the technology appears technically and economically ready for commercialization.

Another user could start with a material such as a cathode precursor rather than a complete battery. COSTIME can trace that material backward through the supply chain toward its constituent minerals and help identify suppliers, processing steps, geographic dependencies, and potential supply risks.

COSTIME also contains substantial supporting data, including approximately 630 specialist-reviewed pouch-cell performance records, hundreds of smart-manufacturing data points, and an AI assistant having knowledge base containing roughly 10,000 pages of publicly available technical and market information. These databases help the software compare a user's assumptions with real-world information. For users without professional battery design expertise, COSTIME provides an AI-assisted design approach that simplifies and bypasses complex battery design processes.

How COSTIME was created

COSTIME was developed at Pacific Northwest National Laboratory (PNNL) with support from the U.S. Department of Energy's Advanced Materials and Manufacturing Technologies Office (AMMTO).

The software grew from the recognition that battery cost cannot be accurately understood by looking at material prices alone. Battery design affects the amount of material required; battery chemistry affects manufacturing equipment and factory environment; factory design affects labor and energy consumption; supply-chain conditions affect material price and availability; and the maturity of a technology affects when large-scale manufacturing can realistically occur.

Therefore, COSTIME was developed as an integrated, bottom-up modeling platform rather than a simple cost calculator.

The development combined several types of expertise. Battery scientists and engineers developed models describing cells, modules, EV packs, and energy-storage containers. Manufacturing models were created to represent processes and factory zones at

commercial production scale, including a modern 20-GWh-class battery plant. Cost models were then connected to the engineering models so that changes to battery design or manufacturing assumptions automatically influence the economic analysis.

Large technical databases were assembled for battery performance, manufacturing, and battery knowledgebase. AI tools were subsequently incorporated to make these databases easier to use. The DataMiner, for example, helps obtain and organize material-price information, while the AI Assistant can retrieve and synthesize technical and market information relevant to an analysis.

Importantly, COSTIME uses AI as an assistant to engineering models rather than as a replacement for them. The core calculations are based on battery design, material balance, manufacturing, and cost models. AI helps users find information, generate inputs, analyze data, and interpret results.

Safety Practice in COSTIME

COSTIME is developed in Python and currently supports Windows operating systems. A macOS version is under development. The AI functions in COSTIME do not involve data training, machine learning model development, or creation of new AI models. Instead, COSTIME uses API services from OpenAI to access and analyze publicly available information. **COSTIME does not use AI models developed outside the United States**, such as DeepSeek, in its software development or implementation.

For AI applications such as Data Miner, COSTIME checks whether data can be legally accessed and parsed from a website by reviewing the site's robots.txt file and applicable terms of use. **Data collection is performed in a legal and ethical manner.** For AI applications such as the AI Assistant and Material Supply Chain, users may enter their own questions, materials, or other inputs. COSTIME performs a **safety screening of user-provided inputs** to help ensure that the requested use is lawful and appropriate. COSTIME screens user inputs in the **following areas:**

1. Never involve any assistance in attacking power grids, water systems, or financial networks.
2. Never involve the creation of cyberweapons or malicious code that could cause significant real-world damage.

3. Never violate the intellectual property rights of others or making defamatory claims about real people.
4. Never help individuals or small groups gain illegitimate societal, military, or economic control (e.g., through election interference or unconstitutional power grabs).
5. Never involve the generation of Child Sexual Abuse Material (CSAM) or providing "uplift" for the creation of biological, chemical, or nuclear weapons.
6. Never process personal identification data.
7. Must respect the legal and creative frameworks of the information it processes.

One practical restriction of COSTIME is that battery designs **exceeding 350 Wh/kg** require an appropriate **export-control** license key; without one, the software limits the design energy density to 350 Wh/kg. COSTIME provides a computer-specific license key only to users who have been cleared for export control by the PNNL's appropriate management team.

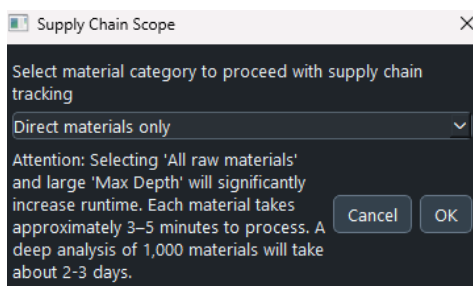
Disclaimer of the software is listed here for review:

This tool, including any data, figures, features, function, or output described herein, or any part thereof (collectively the "Tool") is AI-powered COSTIME software exclusively for non-profit purposes to facilitate the public dissemination of knowledge based upon information generally available to the public and from sources believed to be reliable. This tool may be freely distributed, subject to appropriate citation. The Tool shall not be used for any unauthorized or unlawful purposes. In no event shall COSTIME be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees or losses (including without limitation lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Tool even if advised of the possibility of such damages. The Tool should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. THIS TOOL HAS BEEN DEVELOPED AS AN ACCOUNT OF WORK SPONSORED BY AN AGENCY OF THE UNITED STATES GOVERNMENT. NEITHER THE UNITED STATES GOVERNMENT NOR ANY AGENCY THEREOF, NOR PACIFIC NORTHWEST NATIONAL LAB, NOR ANY OF THEIR EMPLOYEES OR OFFICERS, MAKES ANY WARRANTY, EXPRESS OR IMPLIED, OR ASSUMES ANY LEGAL LIABILITY OR RESPONSIBILITY FOR THE ACCURACY, COMPLETENESS, OR USEFULNESS OF ANY INFORMATION, APPARATUS, PRODUCT, OR PROCESS DISCLOSED, OR REPRESENTS THAT ITS

USE WOULD NOT INFRINGE PRIVATELY OWNED RIGHTS. REFERENCE HEREIN TO ANY SPECIFIC COMMERCIAL PRODUCT, PROCESS, OR SERVICE BY TRADE NAME, TRADEMARK, MANUFACTURER, OR OTHERWISE, DOES NOT NECESSARILY CONSTITUTE OR IMPLY ITS ENDORSEMENT, RECOMMENDATION, OR FAVORING BY THE UNITED STATES GOVERNMENT OR ANY AGENCY THEREOF. THE VIEWS AND OPINIONS OF DOCUMENT AUTHORS EXPRESSED HEREIN DO NOT NECESSARILY STATE OR REFLECT THOSE OF THE UNITED STATES GOVERNMENT OR ANY AGENCY THEREOF, PACIFIC NORTHWEST NATIONAL LAB. This Tool has been developed with the integration of AI tools, including large language models (LLMs), generative AI systems, and web search tools provided by OpenAI. AI assistance may have been used for content generation, summarization, data collection, and analysis. Users remain solely responsible for verifying the safety and appropriateness of any link before accessing it. COSTIME shall not be liable for any damages or losses resulting from the use of external links referenced in this Tool. The AI workflow and tool's structural framework were subjected to human oversight to ensure rigorous accuracy and reliability. However, despite these efforts, the content may not be complete, current, or free from errors. Users are advised to independently verify critical information and to consult qualified professionals before making legal, financial, or other significant decisions. Be advised that advanced features—such as supply chain tracking, commercialization analysis, the AI assistant, data miner, database, and automated report generation—consume a high volume of tokens. To ensure data privacy, commercial AI models only process publicly available information, while a native, localized LLM is utilized to handle sensitive cell, pack, and battery container designs and cost data. COSTIME does not collect, process, or store user credentials. COSTIME respects intellectual property rights and is committed to the ethical use of publicly available data.

Other practices include reminders to users about responsible AI use. E.g.:

**Attention: High token usage and processing time expected.
AI can make mistakes. Check important info.**



Provide sufficient citation for AI generated contents to users.

Log InfoNode InfoEquipment AnalysisEstimated OpenAI Cost: 0.000 / 0.000 \$

U.S. Environmental Protection Agency. "Locating and Estimating Air Emissions from Sources of Styrene (Interim Report)." NEPIS, accessed September 9, 2026. ([nepis.epa.gov](https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000NG1R.TXT&utm_source=openai))

Metrohm. "Online monitoring of TBC in styrene storage tanks according to ASTM D4590." Metrohm Application Note, accessed September 9, 2026. ([metrohm.com](https://www.metrohm.com/en-us/applications/application-notes/process-applications/anpan/an-pan-1027.html?utm_source=openai))

Suppliers:

INEOS Styrolution (United States), LyondellBasell (United States), Americas Styrenics (United States), Westlake Styrene (United States), TotalEnergies/SABIC JV – Carville styrene plant (United States), TotalEnergies – Gonfreville styrene monomer unit (France), Shell/BASF JV – ELLBA Moerdijk (Netherlands), BASF (Germany), Versalis (Italy), Repsol Química (Spain), Lotte Chemical (South Korea), LG Chem (South Korea), Sinopec Zhenhai Refining & Chemical (China), CNOOC and Shell Petrochemicals Co. (CSPC) (China), Hengli Petrochemical (China), Shenghong Refining & Chemical (China), Idemitsu Kosan (Japan), Asahi Kasei (Japan)

Suppliers Region:

United States:5, China:4, South Korea:2, Japan:2, France:1, Netherlands:1, Germany:1, Italy:1, Spain:1

Risk - US: Low
Risk - Europe: High
Risk - China: Medium

Justification:

US: Low risk because the United States has multiple large, continuous, world-scale styrene monomer producers with integrated ethylbenzene/styrene units and established Gulf Coast logistics (rail/barge/ship) supporting multi-million-ton supply. Examples include INEOS Styrolution Bayport (Texas) styrene monomer operations, LyondellBasell Channelview producing styrene monomer, AmSty St. James (Louisiana) producing styrene monomer via EB dehydrogenation and vacuum distillation, and Westlake Styrene producing high-purity styrene with terminal logistics. U.S. regulatory compliance is mature (EPA air programs and NESHAP frameworks for related polymers/resins), but does not appear to be causing a supply shortage in 2026. ([nepis.epa.gov](https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P101GN04.TXT&utm_source=openai))

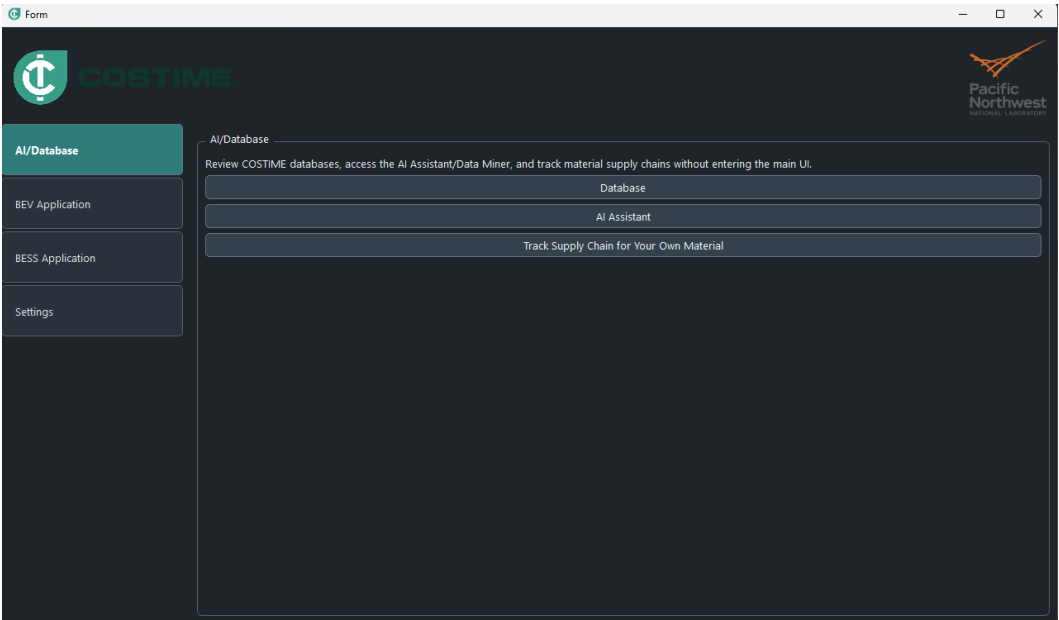
EU: High risk because Europe has comparatively higher feedstock/energy-cost disadvantage versus North America (reducing competitiveness and incentivizing rationalization), and regulatory/compliance cost is structurally high under the Industrial Emissions Directive BAT Conclusions for LVOc (explicitly covering styrene monomer via EB dehydrogenation or SM/PO) plus additional carbon-cost exposure such as CBAM definitive regime from 1 January 2026 for covered imports (increasing compliance and administrative burden for cross-border supply chains). While Europe still has major producers (e.g., ELLBA Moerdijk; TotalEnergies Gonfreville; BASF; Versalis; Repsol), the region is more exposed to cost/permit constraints and import sensitivity, hence higher risk in 2026. ([ineos.com](https://www.ineos.com/globalassets/investor-quattro-ir/public-annual-reports/ineos-quattro-holdings-limited---annual-report-2024.pdf?utm_source=openai))

CN: Medium risk because China has very large and growing domestic styrene capacity (including major new world-scale integrated complexes and SM/PO units), but demand from downstream ABS/PS and broader manufacturing remains high and cyclical, and compliance pressures for VOCs/industrial emissions are

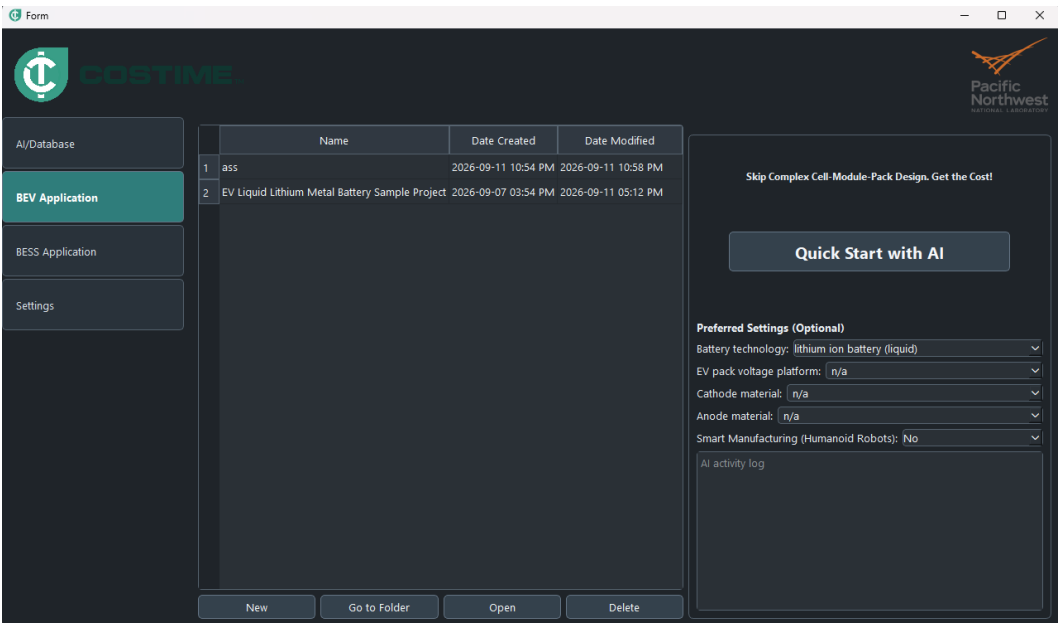
COSTIME UI snapshots

1 Homepage

1.1 Start AI/Database: access database (battery performance, smart manufacturing), AI Assistant (and Data Miner), and Supply chain of interested materials directly without the need to open a specific project/task.



1.2 Start BEV project or BESS project: select BEV or BESS application. Choose design by yourself if you are battery expert or Quick Start with AI if not a battery expert.



1.3 Settings: provide OpenAI API key, Export control licence key if desinged above 350 Wh/kg battery.

Form

COSTIME

Pacific Northwest
NATIONAL LABORATORY

AI/Database

BEV Application

BESS Application

Settings

AI API Settings

Enter your OpenAI API key to enable COSTIME AI features. The key is available through the official OpenAI API platform: <https://platform.openai.com/api-keys> and stored locally only.

OpenAI API key

Search API Settings

Enter a SerpApi API key to enable Data Miner web search. This search API is optional and available at <https://serpapi.com/pricing>. Without it, Data Miner will use local databases and OpenAI only.

SerpAPI API key

Export Control Settings

Copy Device ID

Export Control License

No export-control license has been entered.

An export-control license is required for battery designs above 350 Wh/kg. Without a valid license key, energy density is limited to 350 Wh/kg. Click Copy Device ID and send the code to the POC listed under About. The license is bound to this PC and Windows user and expires 365 days after issuance, even if entered later. A working Windows TPM is required; no online activation is used.

Appearance Settings

Home logo colorDark Green

Appearance modeNight Mode

Font size10 pt

Save Settings

2 UI for a specific project/task (use BEV as example, BESS is similar)

2.1 Define battery pack input

Home Stack 10 pf [Help](#) [Database](#) [Account](#) [Data Miner](#) [Abbreviations](#) [About](#)

[PIS](#) [PIS](#) [Create](#)

- Design Material Manufacturing Cost Supply Chain Commercialization

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6 Step 7 Step 8 Step 9 Step 10

Pack Setting

Battery Pack

	Minimum	Maximum
State of Charge (%)	10.00	95.00
Energy of Pack (Wh)	60.00	Final energy will be recalculated based on the selected chemistry and cell-module-pack design.
Cell Reliability (%)	99.90	
Cell Voltage (V)	3.70	
Battery Chemistry (anode)	Material A	Material B
Battery Chemistry (cathode)	NMC622	Only for Step 1-6
Battery Type	Lithium metal battery (cell-solid state)	Only for Step 1-6
External Pressure Module	Yes	No

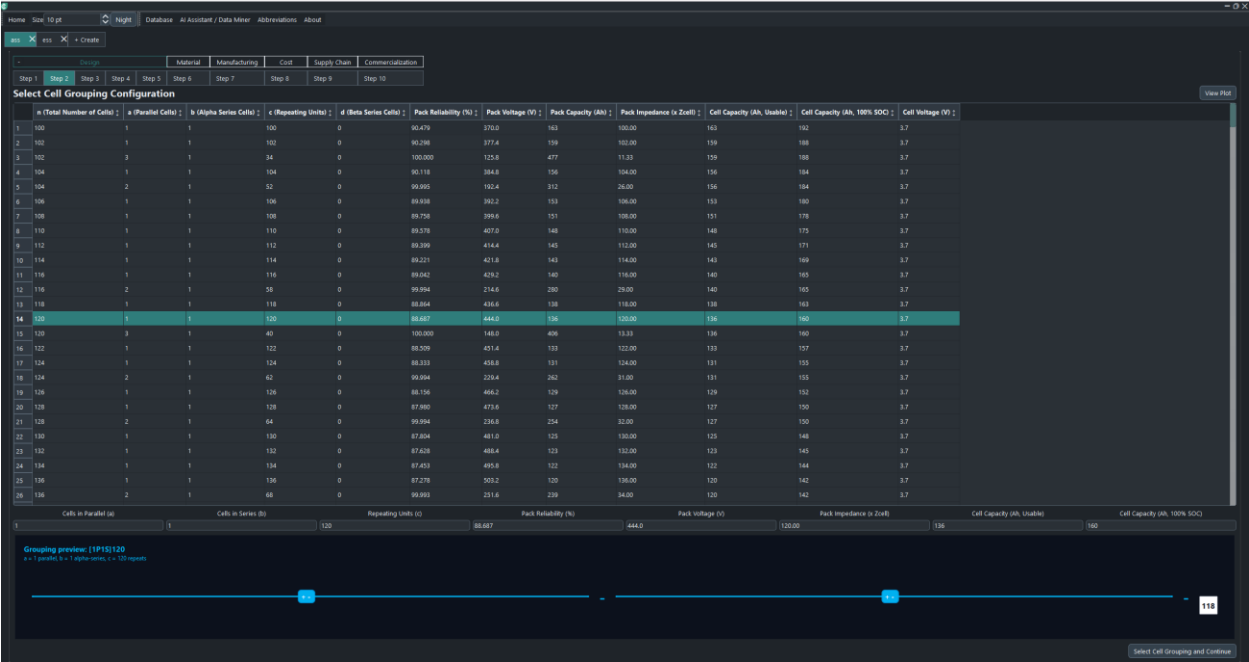
Cell Grouping Topology

	Minimum	Maximum
Total Cell Numbers ($n^{\text{TC}} \times n^{\text{M}} \times n^{\text{B}}$)	100	500
Cells Connected in Parallel (n)	1	10
Cells Connected in Series in one Repeating Unit (B)	1	1

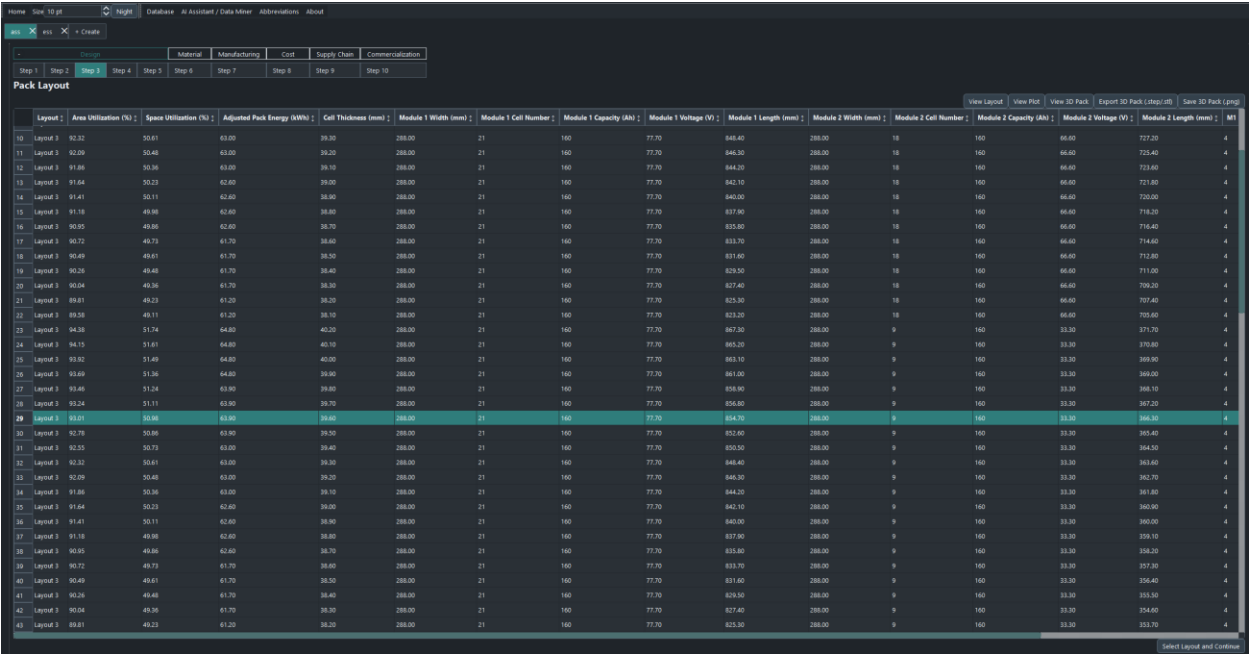
[View Topology](#)

Continue

2.2 Select battery grouping configuration



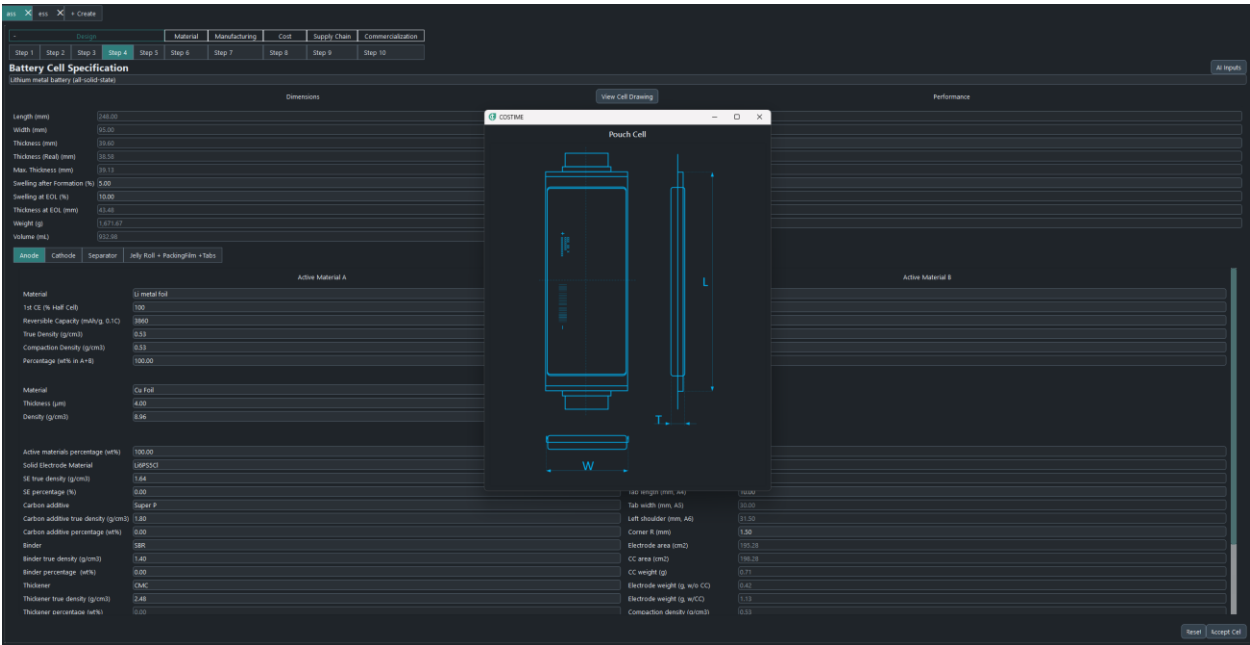
2.3 Select Pack layout



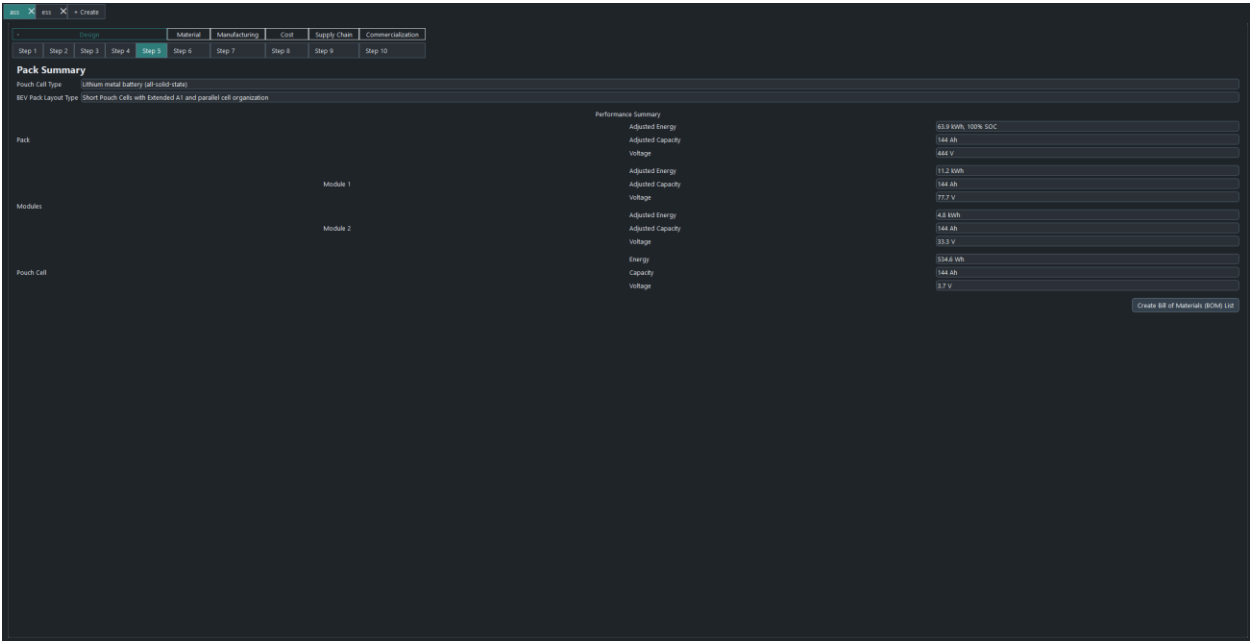
2.3.1View how a selected battery pack looks like



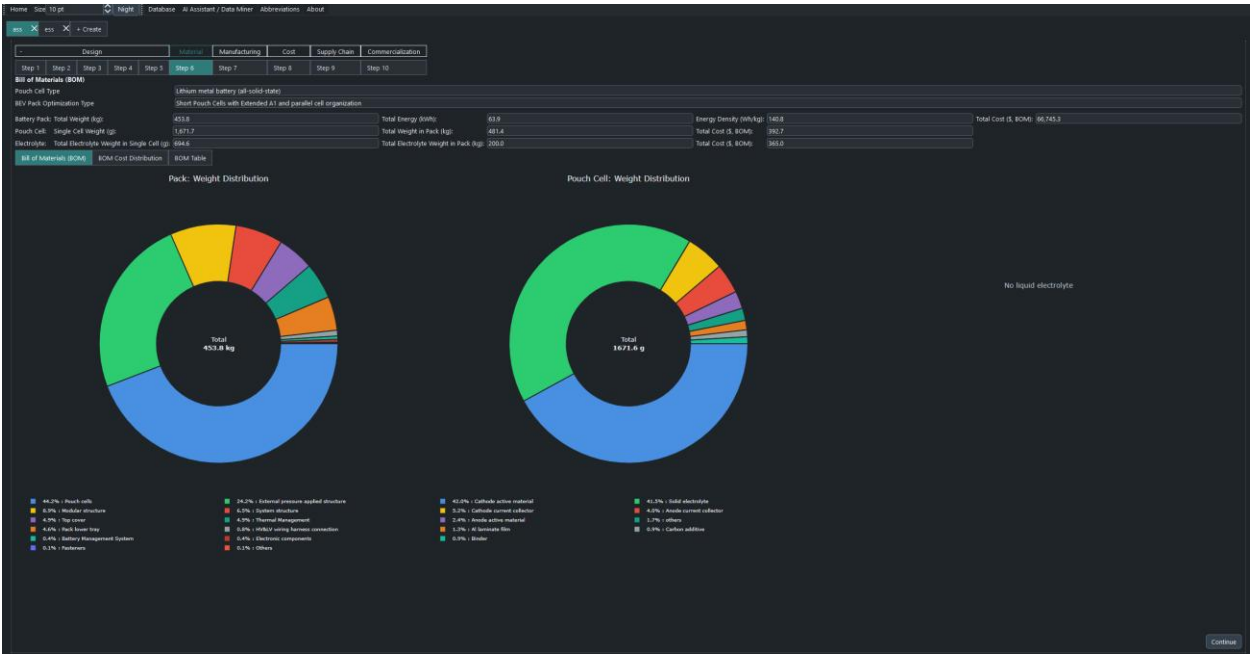
2.4 Design a battery



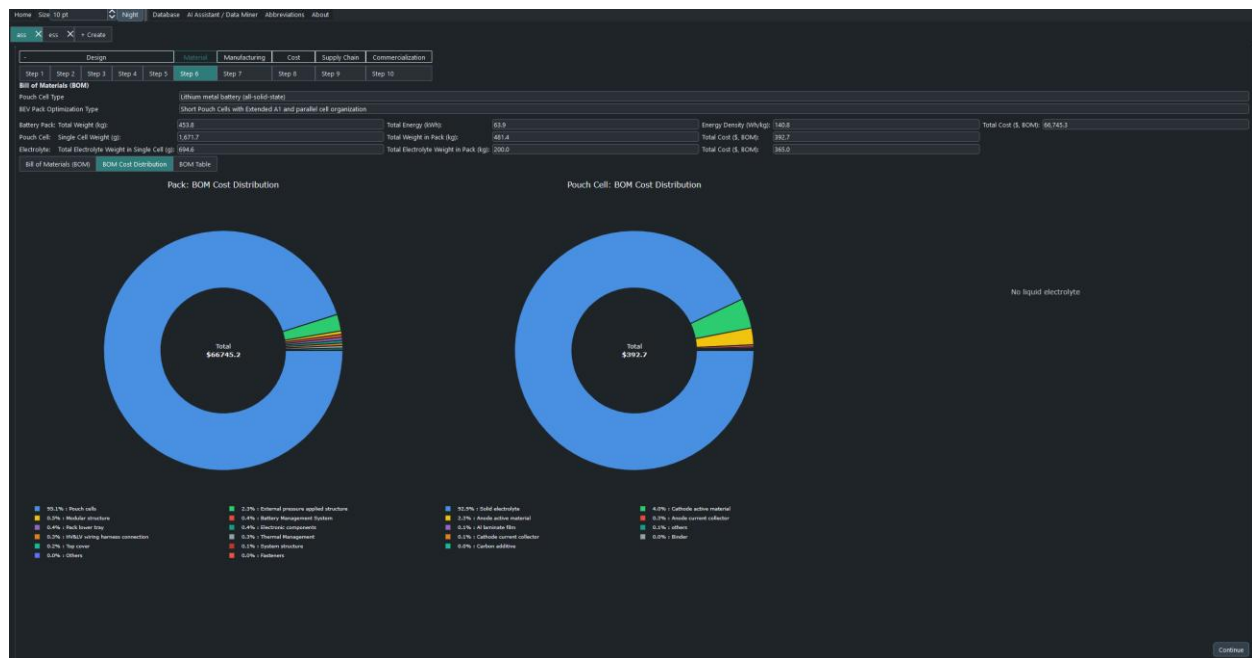
2.5 Battery specification after designed



2.6 Weight, cost, and Bill of materials summary of battery, module and pack.



2.6.1 Cost summary of battery and battery Pack



2.6.2 Bill of Materials table creation and price input.

newSun, 10 Feb

PageDatabase - 40 Accounts / Data Miner - 40 Parameters - About

asxexit+ Create

</

2.6.3 Double click dark blue cells in above BOM table, triggers Data Miner. Search price data of materials by AI Data Miner.

HomeSize: 10 ptNightDatabaseAI Assistant / Data MinerAbbreviationsAbout

DesignManufacturingCostSupply ChainCommercialization

Step 1Step 2Step 3Step 4Step 5Step 6Step 7Step 8Step 9Step 10

Bill of Materials (BOM)

Pouch Cell TypeLithium metal battery (all-solid-state)

BEV Pack Optimization TypeShort Pouch Cells with Extended A1 and parallel cell organization

Battery Pack: Total Weight (kg)423.9Total Energy (kWh)50.9Energy Density (Wh/kg)148.8Total Cost (\$, BOM)75,747.6

Pouch Cell: Single Cell Weight (g)1,671.2Total Weight in Pack (kg)481.4Total Cost (\$, BOM)292.7

Electrolyte: Total Electrolyte Weight in Single Cell (g)494.6Total Electrolyte Weight in Pack (kg)200.0Total Cost (\$, BOM)365.0

BOM of Materials (BOM)BOM Cost DistributionBOM Table

Default priceUpdated priceUpdate BOM

Part No.	Parts Name	Parts No.	Definition(Synonym)	Materials	Density(g/cm3)	Unit Weight (g)	Unit	Quantity	Total weight(g)	Weight percentage(%)	Components type	Material price(\$/kg, AI)	Manufacturing cost rate(%)	Manufacturing
68	Endring plates	P-OS-088	Endring Plates...	Marging...	0.01	1,588.09	EA	12.00	19.06	4.20	External pressure...	13.00	40.00	
69	Steel belt	P-OS-089	Steel Belt...	Marging...	0.01	3,871.62	EA	8.00	30.97	6.83	External pressure...	13.00	40.00	
70	Steel belt...	P-OS-070	Steel Belt...	Marging...	0.01	3,595.30	EA	4.00	14.38	3.17	External pressure...	13.00	40.00	
71	Aluminum...	P-OS-071	Disc Spring Load-L...	Aluminum...	0.00	41.20	EA	36.00	1.48	0.33	External pressure...	5.00	40.00	
72	Aluminum...	P-OS-072	Disc Spring Load-L...	Aluminum...	0.00	29.72	EA	36.00	1.07	0.24	External pressure...	5.00	40.00	
73	Disc springs...	P-OS-073	Disc Springs Roll...	Steel42Cr...	/	46.00	EA	36.00	1.73	0.38	External pressure...	0.80	65.00	
74	Disc springs...	P-OS-074	Disc Springs Roll...	Steel42Cr...	/	2.20	EA	36.00	0.09	0.02	External pressure...	0.80	65.00	
75	Flexible pre...	P-OS-075	Flexible preform struc...	plastic+co...	0.01	23.63	EA	8.00	0.19	0.04	Modular structure...	/	/	/
76	Flexible pre...	P-OS-076	Flexible preform struc...	plastic+co...	0.01	18.92	EA	8.00	0.15	0.03	Modular structure...	/	/	/
77									Pack/Module Total Weight(g)	431.81				
78	Pouch Cell	C-M5-001	/	/	/	702.77	g	288.00	202.40	42.04	Cathode active m...	22.53	/	/
79	N/A	C-M5-002	/	/	/	0.00	g	288.00	0.00	0.00	Cathode active m...	N/A	/	/
80	Al foil	C-M5-003	/	/	/	87.00	g	288.00	25.06	5.20	Cathode current c...	5.25	/	/
81	Li10GaP2S12	C-M5-004	/	/	/	128.30	g	288.00	37.30	7.75	Solid electrolyte	325.50	/	/
82	Super P	C-M5-005	/	/	/	15.54	g	288.00	4.48	0.93	Carbon additive	5.79	/	/
83	PTFE	C-M5-006	/	/	/	15.54	g	288.00	4.48	0.93	Binder	7.62	/	/
84	Li metal foil	C-M5-007	/	/	/	38.63	g	288.00	11.41	2.37	Anode active mat...	134.00	40.00	
85	N/A	C-M5-008	/	/	/	0.00	g	288.00	0.00	0.00	Anode active mat...	N/A	/	/
86	Co foil	C-M5-009	/	/	/	67.31	g	288.00	19.44	4.08	Anode current col...	16.77	/	/
87	LiPSiSC	C-M5-010	/	/	/	0.00	g	288.00	0.00	0.00	Solid electrolyte	325.50	/	/
88	Super P	C-M5-011	/	/	/	0.00	g	288.00	0.00	0.00	Carbon additive	5.79	/	/
89	IBR	C-M5-012	/	/	/	0.00	g	288.00	0.00	0.00	Binder	9.06	/	/
90	CNC	C-M5-013	/	/	/	0.00	g	288.00	0.00	0.00	Binder	10.76	/	/
91	Li10GaP2S12	C-M5-014	/	/	/	279.04	g	288.00	80.36	16.69	Solid electrolyte	325.50	/	/
92	LiPSiSC	C-M5-015	/	/	/	286.02	g	288.00	82.37	17.11	Solid electrolyte	325.50	/	/
93	Al laminate f...	C-M5-016	/	/	/	21.35	g	288.00	6.15	1.28	Al laminate film	6.60 \$/m2	/	/
94	Al tab	C-M5-017	/	/	/	10.27	g	288.00	2.96	0.61	others	/	/	/
95	Ni tab	C-M5-018	/	/	/	17.30	g	288.00	5.04	1.05	others	/	/	/
96									Single Cell Weight(g)	1,671.67				
									Total Cell Weight in Pac...	481.44				

Single click: set value. Double click: launch AI DataMiner.

Continue

AI Assistant / Data Miner

Attention: High token usage and processing time, dependent on user-made materials. Check important info.

AI AssistantData Miner

Item: Li metal foilType: Material pricePrice: \$134.00Other: Local

Unit: 1kgApp: Search by keyword

Other Name: Separator, separator by common

OpenAI Code: GPT-4Search Time: 0Search AI: Run

Ready: Please enter a valid OpenAI API key in Setting. Without it, Data Miner cannot function.

Result:

ItemTypeValue

No data yet. Please wait for the result.

2.6.4 Switch to “AI Assistant” ask any questions about battery.

HomeSize: 10 ptNightDatabaseAI Assistant / Data MinerAbbreviationsAbout

DesignManufacturingCostSupply ChainCommercialization

Step 1Step 2Step 3Step 4Step 5Step 6Step 7Step 8Step 9Step 10

Bill of Materials (BOM)

Pouch Cell TypeLithium metal battery (all-solid-state)

BEV Pack Optimization TypeShort Pouch Cells with Extended A1 and parallel cell organization

Battery Pack: Total Weight (kg)423.9Total Energy (kWh)50.9Energy Density (Wh/kg)148.8Total Cost (\$, BOM)75,747.6

Pouch Cell: Single Cell Weight (g)1,671.2Total Weight in Pack (kg)481.4Total Cost (\$, BOM)292.7

Electrolyte: Total Electrolyte Weight in Single Cell (g)494.6Total Electrolyte Weight in Pack (kg)200.0Total Cost (\$, BOM)365.0

BOM of Materials (BOM)BOM Cost DistributionBOM Table

Default priceUpdated priceUpdate BOM

Part No.	Parts Name	Parts No.	Definition(Synonym)	Materials	Density(g/cm3)	Unit Weight (g)	Unit	Quantity	Total weight(g)	Weight percentage(%)	Components type	Material price(\$/kg, AI)	Manufacturing cost rate(%)	Manufacturing
68	Endring plates	P-OS-088	Endring Plates...	Marging...	0.01	1,588.09	EA	12.00	19.06	4.20	External pressure...	13.00	40.00	
69	Steel belt	P-OS-089	Steel Belt...	Marging...	0.01	3,871.62	EA	8.00	30.97	6.83	External pressure...	13.00	40.00	
70	Steel belt...	P-OS-070	Steel Belt...	Marging...	0.01	3,595.30	EA	4.00	14.38	3.17	External pressure...	13.00	40.00	
71	Aluminum...	P-OS-071	Disc Spring Load-L...	Aluminum...	0.00	41.20	EA	36.00	1.48	0.33	External pressure...	5.00	40.00	
72	Aluminum...	P-OS-072	Disc Spring Load-L...	Aluminum...	0.00	29.72	EA	36.00	1.07	0.24	External pressure...	5.00	40.00	
73	Disc springs...	P-OS-073	Disc Springs Roll...	Steel42Cr...	/	46.00	EA	36.00	1.73	0.38	External pressure...	0.80	65.00	
74	Disc springs...	P-OS-074	Disc Springs Roll...	Steel42Cr...	/	2.20	EA	36.00	0.09	0.02	External pressure...	0.80	65.00	
75	Flexible pre...	P-OS-075	Flexible preform struc...	plastic+co...	0.01	23.63	EA	8.00	0.19	0.04	Modular structure...	/	/	/
76	Flexible pre...	P-OS-076	Flexible preform struc...	plastic+co...	0.01	18.92	EA	8.00	0.15	0.03	Modular structure...	/	/	/
77									Pack/Module Total Weight(g)	431.81				
78	Pouch Cell	C-M5-001	/	/	/	702.77	g	288.00	202.40	42.04	Cathode active m...	22.53	/	/
79	N/A	C-M5-002	/	/	/	0.00	g	288.00	0.00	0.00	Cathode active m...	N/A	/	/
80	Al foil	C-M5-003	/	/	/	87.00	g	288.00	25.06	5.20	Cathode current c...	5.25	/	/
81	Li10GaP2S12	C-M5-004	/	/	/	128.30	g	288.00	37.30	7.75	Solid electrolyte	325.50	/	/
82	Super P	C-M5-005	/	/	/	15.54	g	288.00	4.48	0.93	Carbon additive	5.79	/	/
83	PTFE	C-M5-006	/	/	/	15.54	g	288.00	4.48	0.93	Binder	7.62	/	/
84	Li metal foil	C-M5-007	/	/	/	38.63	g	288.00	11.41	2.37	Anode active mat...	134.00	40.00	
85	N/A	C-M5-008	/	/	/	0.00	g	288.00	0.00	0.00	Anode active mat...	N/A	/	/
86	Co foil	C-M5-009	/	/	/	67.31	g	288.00	19.44	4.08	Anode current col...	16.77	/	/
87	LiPSiSC	C-M5-010	/	/	/	0.00	g	288.00	0.00	0.00	Solid electrolyte	325.50	/	/
88	Super P	C-M5-011	/	/	/	0.00	g	288.00	0.00	0.00	Carbon additive	5.79	/	/
89	IBR	C-M5-012	/	/	/	0.00	g	288.00	0.00	0.00	Binder	9.06	/	/
90	CNC	C-M5-013	/	/	/	0.00	g	288.00	0.00	0.00	Binder	10.76	/	/
91	Li10GaP2S12	C-M5-014	/	/	/	279.04	g	288.00	80.36	16.69	Solid electrolyte	325.50	/	/
92	LiPSiSC	C-M5-015	/	/	/	286.02	g	288.00	82.37	17.11	Solid electrolyte	325.50	/	/
93	Al laminate f...	C-M5-016	/	/	/	21.35	g	288.00	6.15	1.28	Al laminate film	6.60 \$/m2	/	/
94	Al tab	C-M5-017	/	/	/	10.27	g	288.00	2.96	0.61	others	/	/	/
95	Ni tab	C-M5-018	/	/	/	17.30	g	288.00	5.04	1.05	others	/	/	/
96									Single Cell Weight(g)	1,671.67				
									Total Cell Weight in Pac...	481.44				

Single click: set value. Double click: launch AI DataMiner.

Continue

AI Assistant / Data Miner

Attention: High token usage and processing time, dependent on user-made materials. Check important info.

AI AssistantData Miner

Item: Li metal foilType: Material pricePrice: \$134.00Other: Local

Unit: 1kgApp: Search by keyword

Other Name: Separator, separator by common

OpenAI Code: GPT-4Search Time: 0Search AI: Run

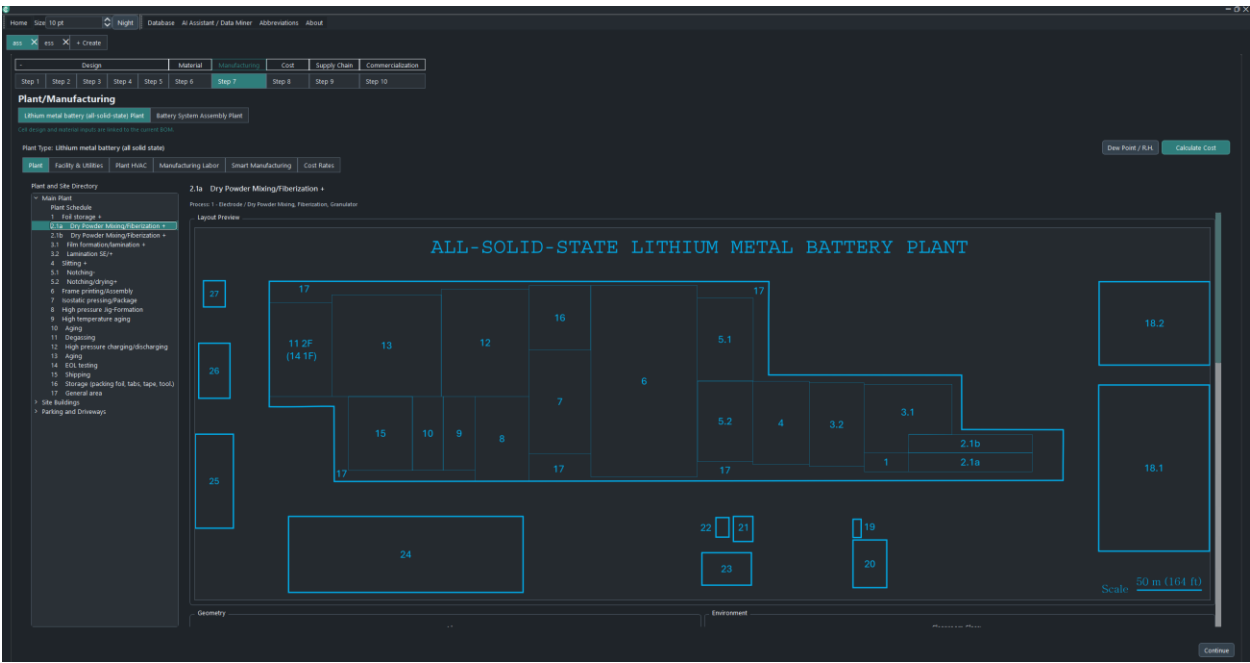
Ready: Please enter a valid OpenAI API key in Setting. Without it, Data Miner cannot function.

Result:

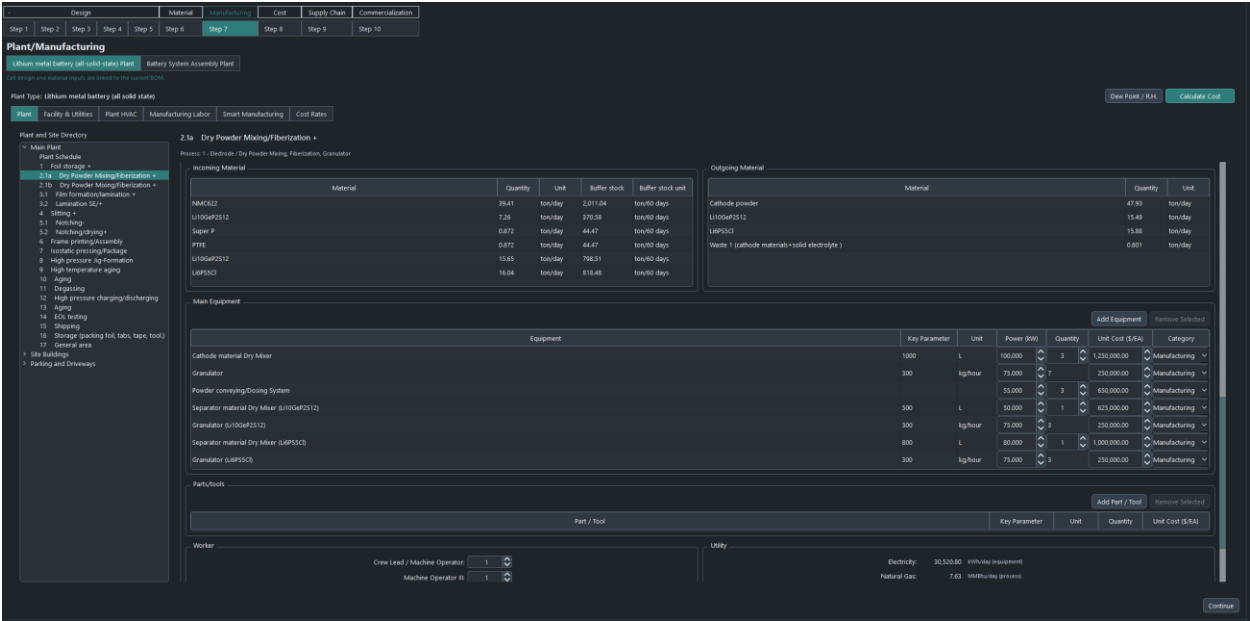
ItemTypeValue

No data yet. Please wait for the result.

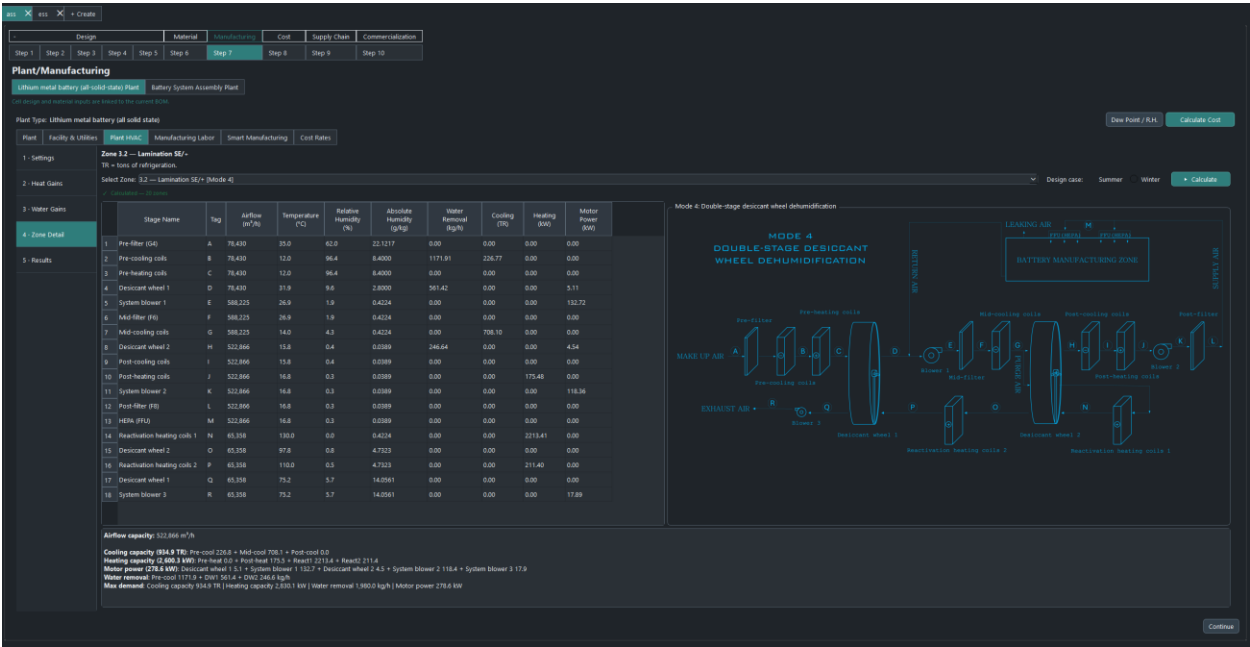
2.7 Define how to manufacture the designed battery in a plant



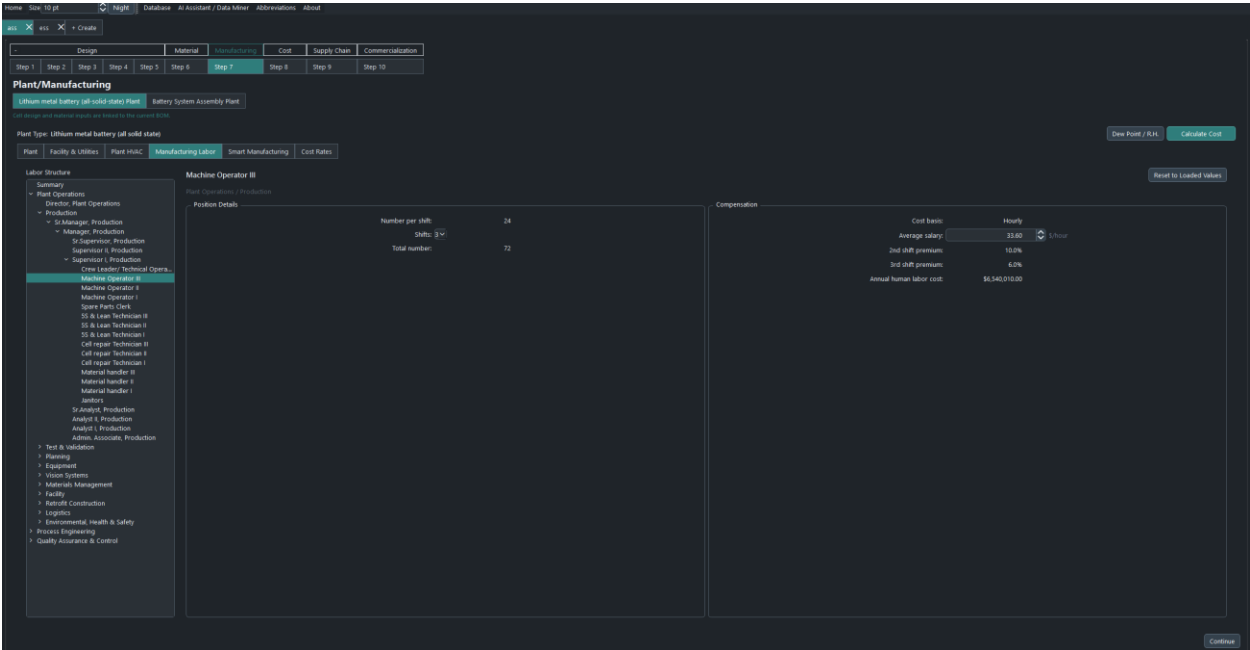
2.7.1 Define the material, equipment, cost, labor, utility in each manufacturing zone



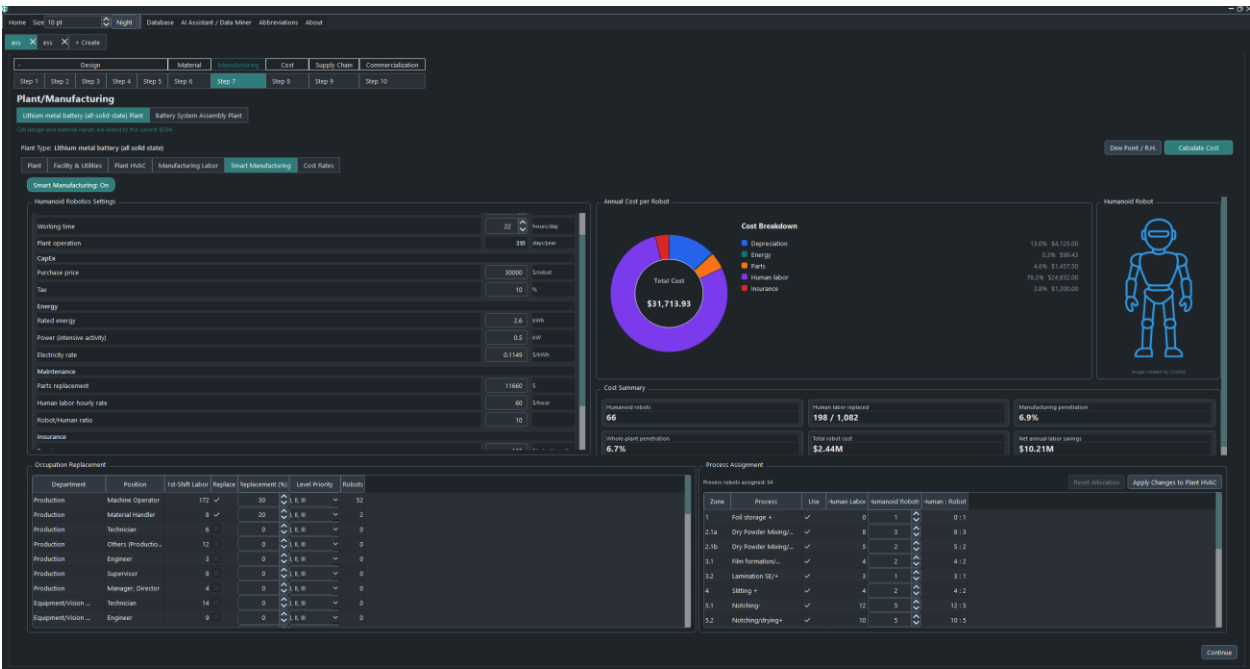
2.7.2 Define the HVAC (Heating, ventilation, and air conditioning) needs for the plant



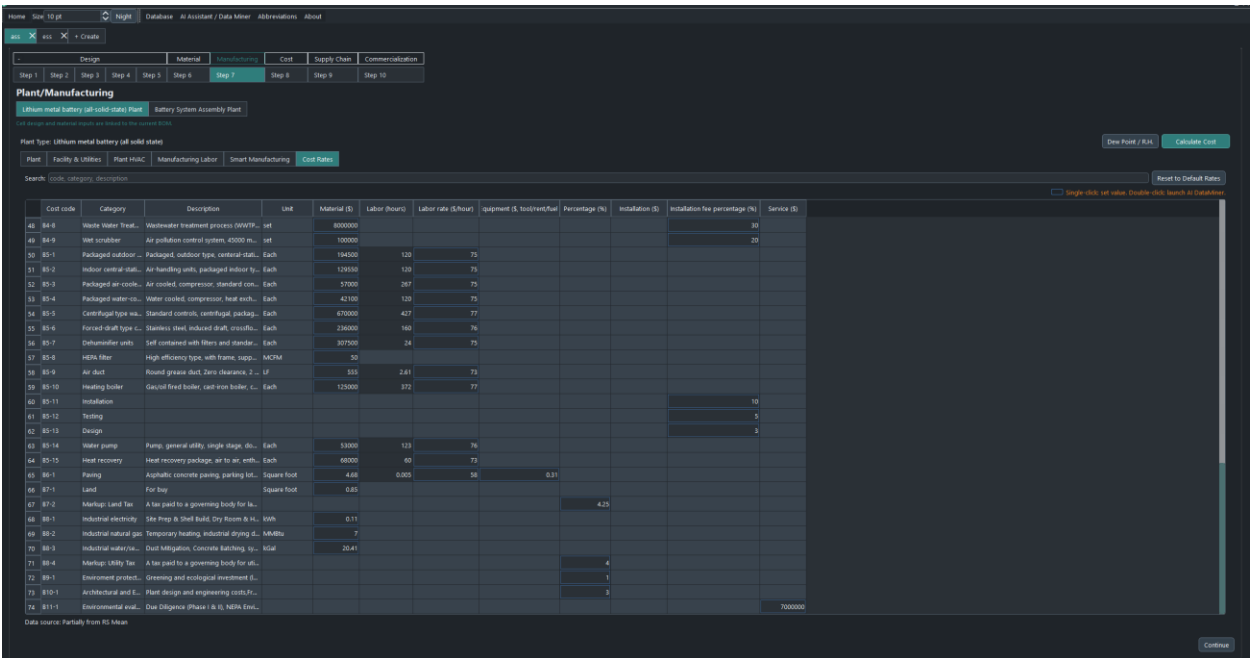
2.7.3 Define the labors for the battery plant



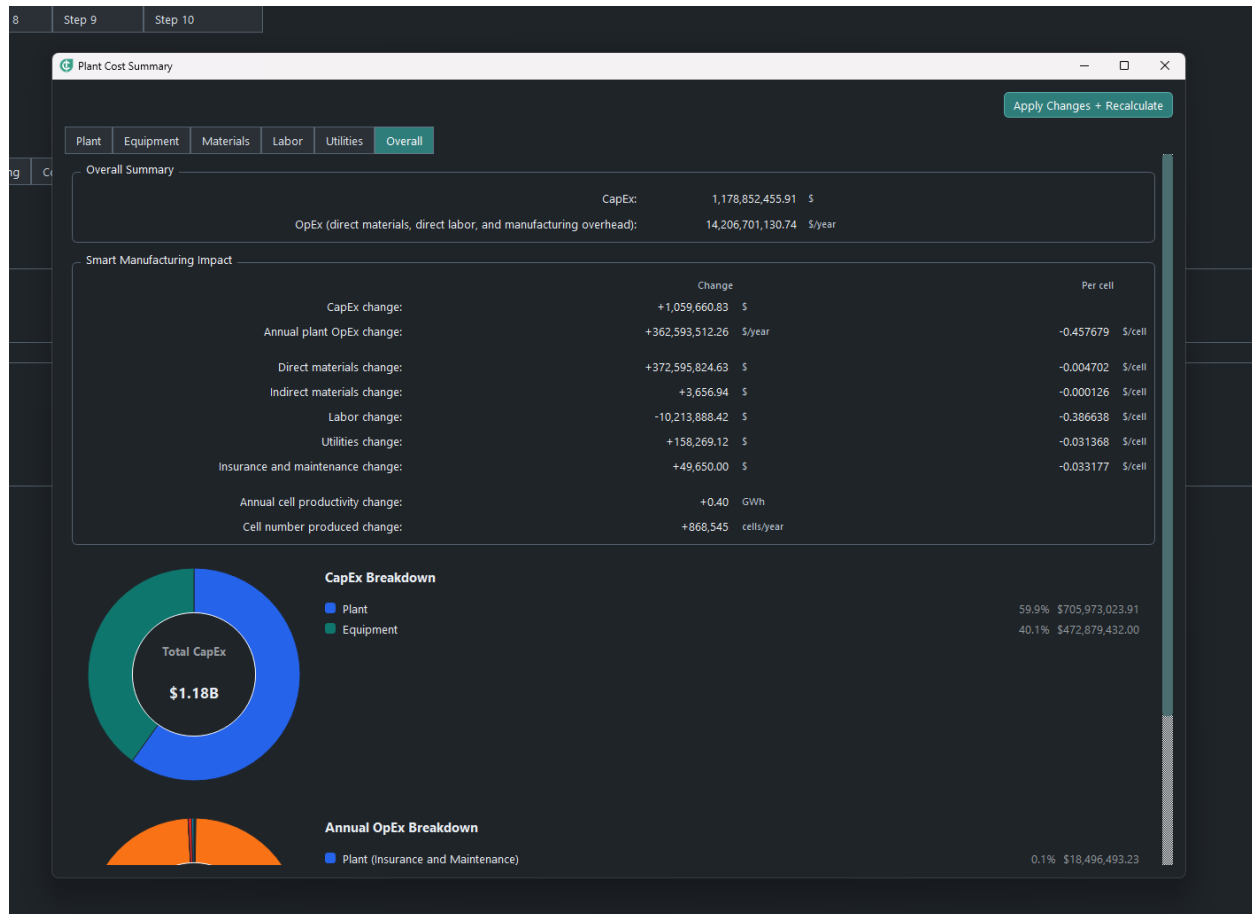
2.7.4 Define the application of humanoid robotics.



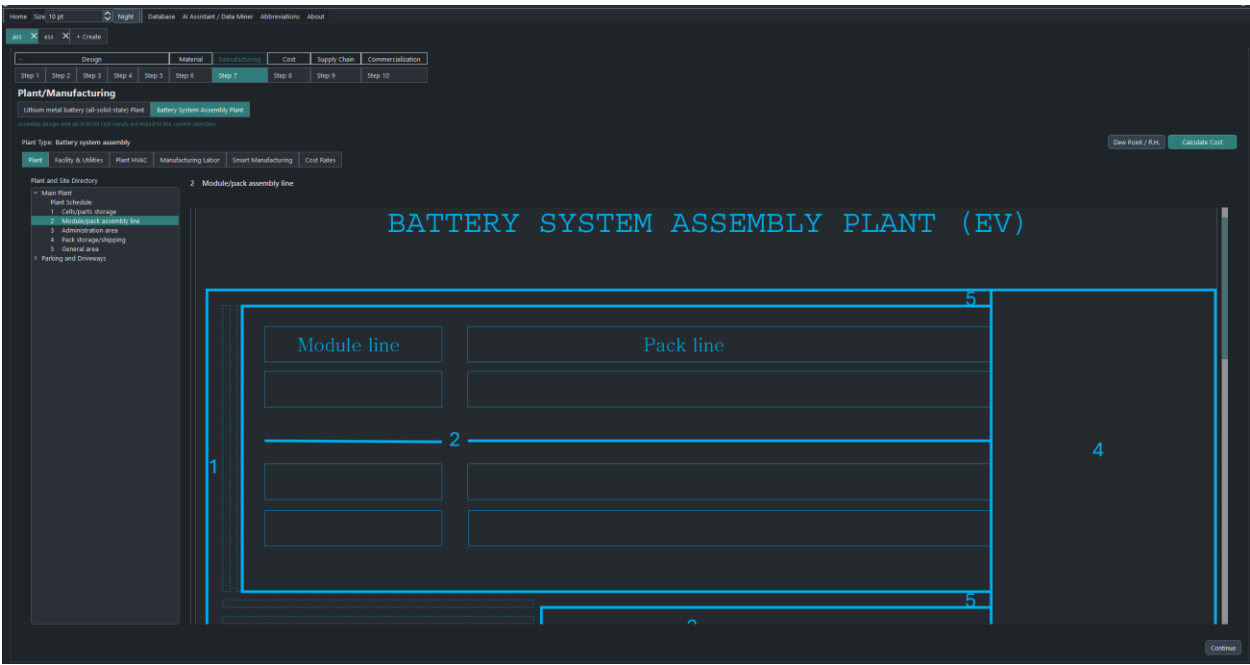
2.7.5 Determine the Cost rates for cost estimation



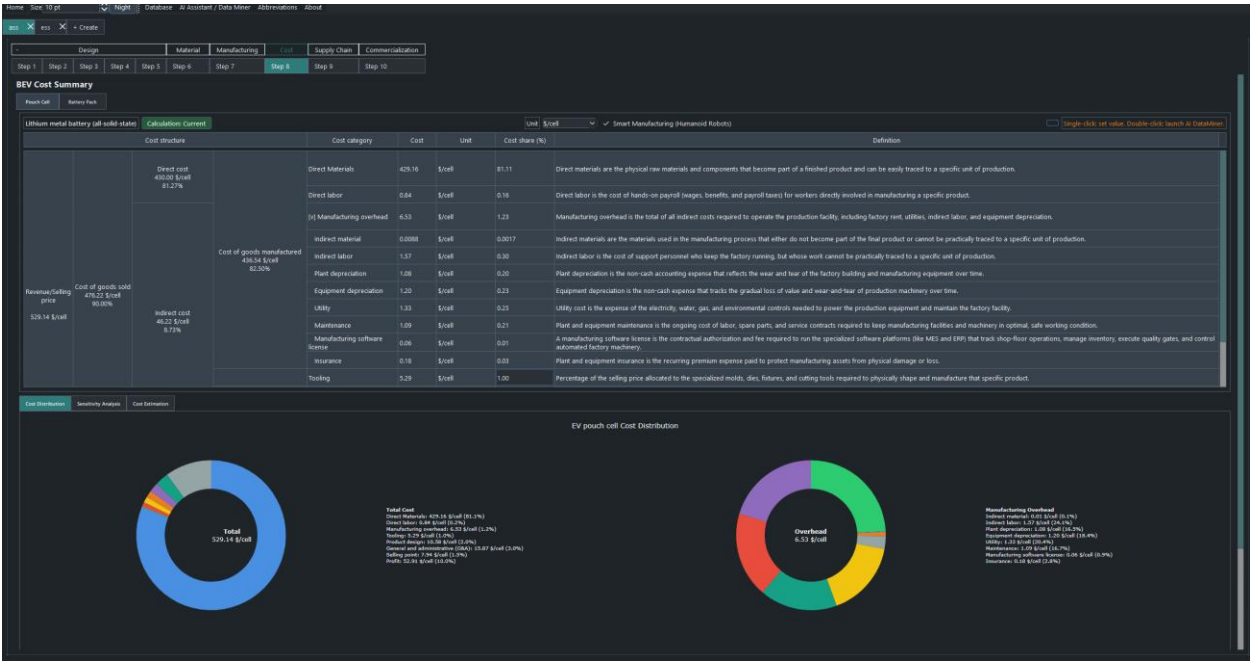
2.7.6 Summarize the final cost for plant, equipment, materials, labor, utilities and overall impact



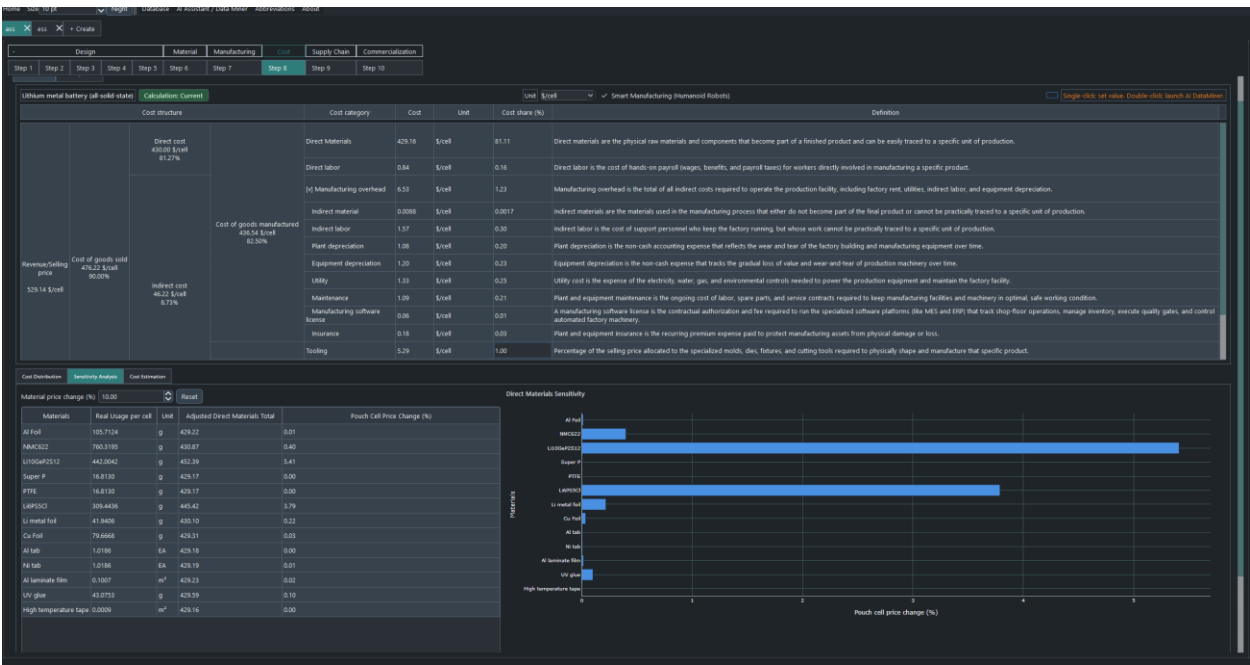
2.7.7. Same work flow as cell plant for battery pack manufacturing plant



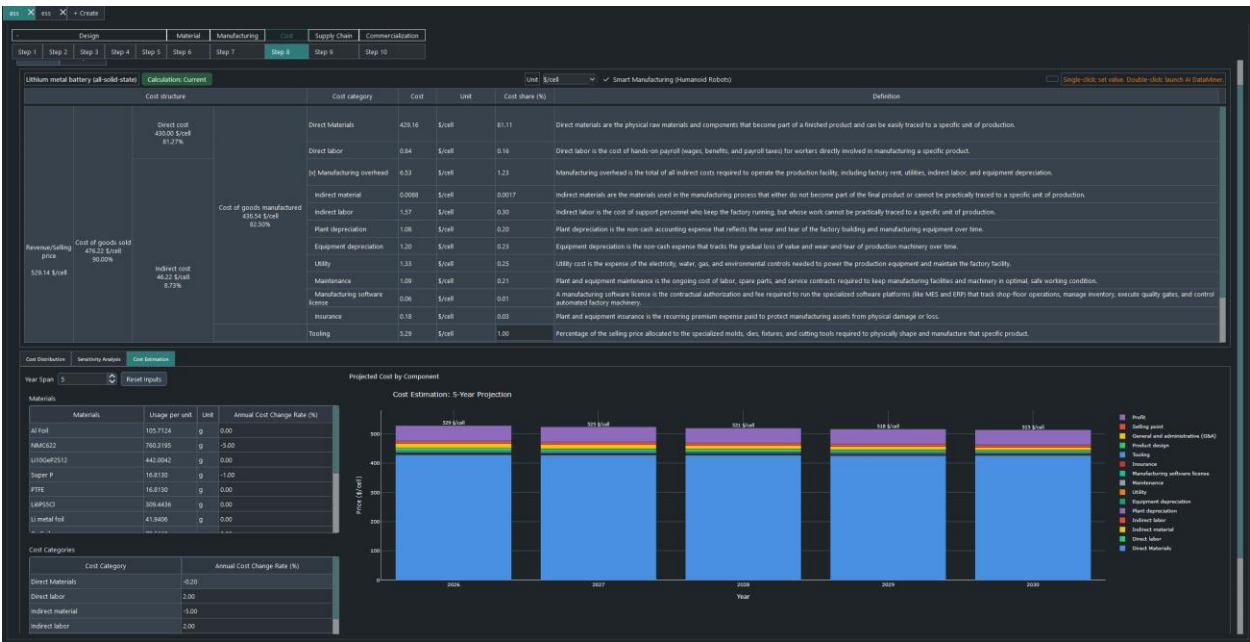
2.8 Final cost summary according to standard cost accounting.



2.8.1 Perform sensitive analysis

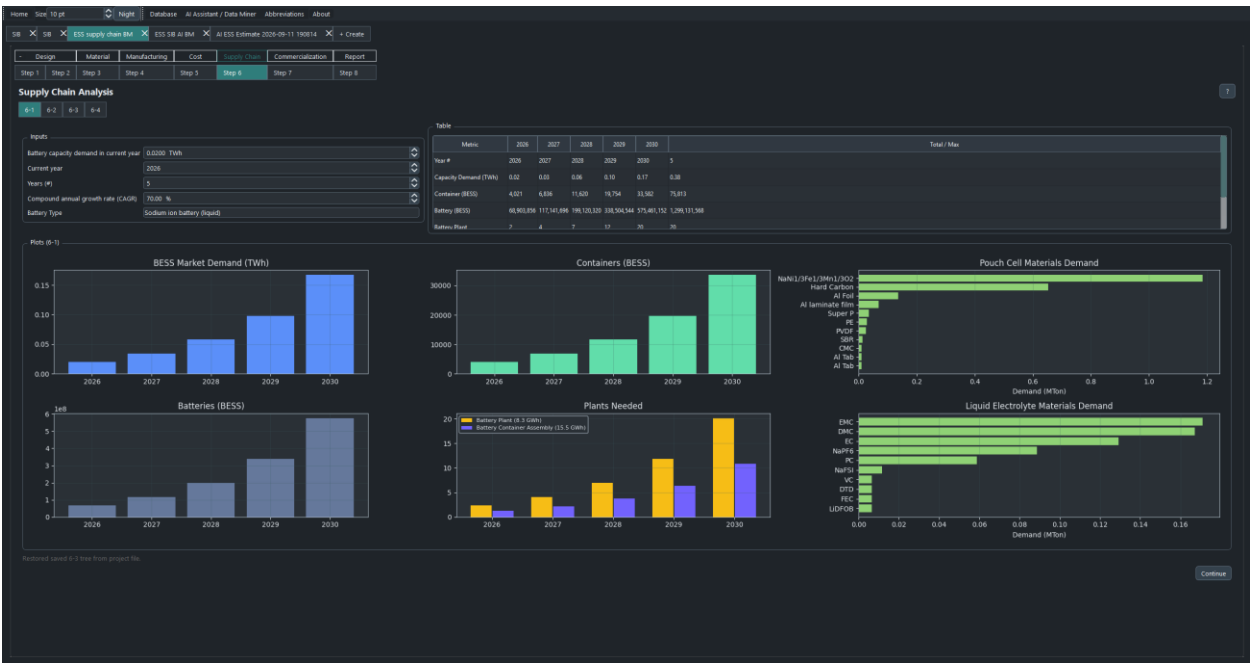


2.8.2 Perform Cost projection

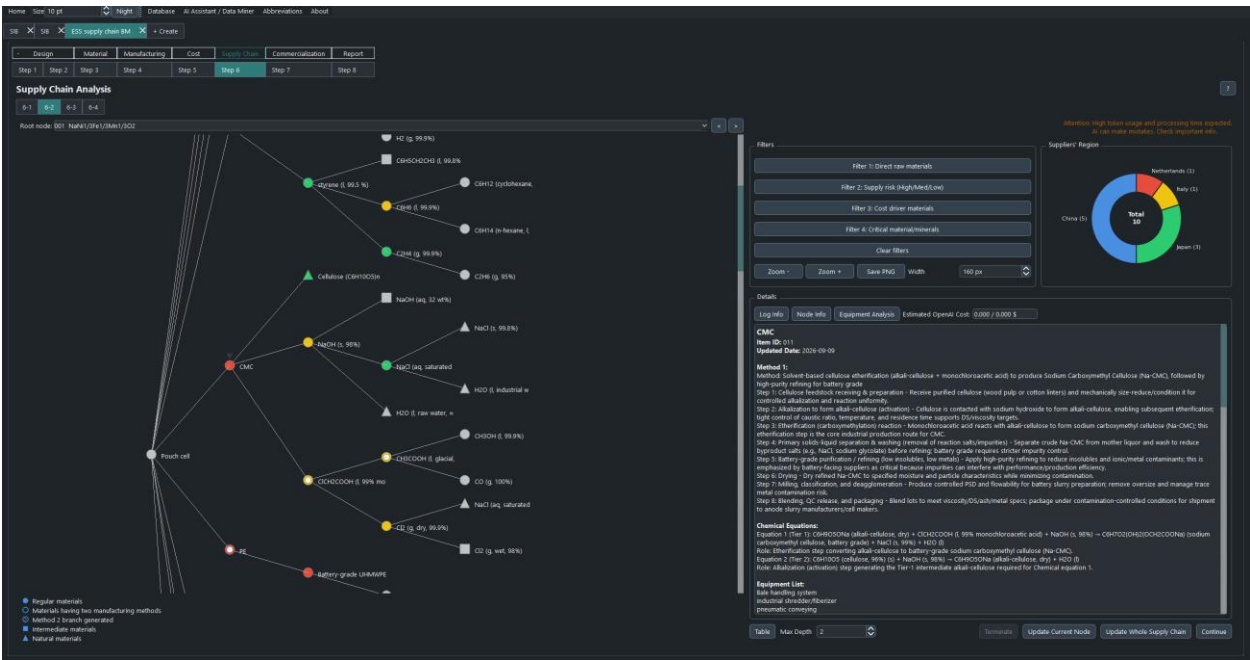


2.9 Market Demand and Supply Chain tracking (Use BESS examples)

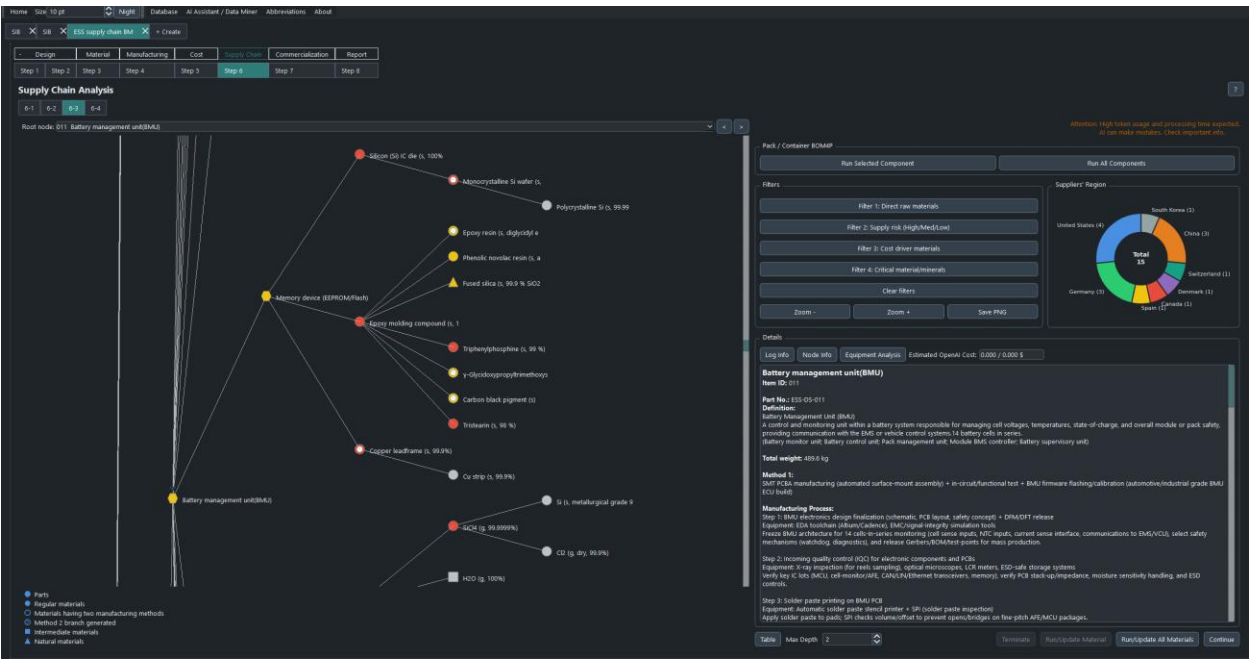
2.9.1 Market demand projection for materials, batteries, packs/containers



2.9.2 Supply chain tracking for battery materials, including suppliers, risk, manufacturing and equipment.



2.9.3 Supply chain tracking for battery parts of packs/containers



2.10 Market investigation of Battery technology.

2.10.1 If battery technology is commercialized, COSTIME will do vendor analysis from perspectives of technology, stock, news release.

Nov 10, 2024

Home | Dashboard | AI Account | Data Mover | Information | About

ESS Sodium ion Battery Sample Project

1 | Create

Design

Material

Manufacturing

Cost

Supply Chain

Commercial Validation

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Step 7

ESS Performance Analysis

7.1 | 7.2

Cell Info

Battery Type: Sodium ion battery (liquid)

Market Investigation

Step 1: Shipping

Step 2: Product validation

Step 3: Vendor Study

Step 4: Company Investigation

Step 5: Sample Status

Summary

Battery type: Sodium ion battery (liquid)

Commercial status: Commercial Sodium ion battery (liquid) products were validated (3 products meet the link, price, and capacity requirements).

Sample status: Not applicable - commercial product validated

Justification: Commercialization stage estimates are only used when no commercial product is available.

Commercialization timeline: Not applicable - commercial product validated

Log Info

Step Info

Commercialization Timeline Based on Market Investigation

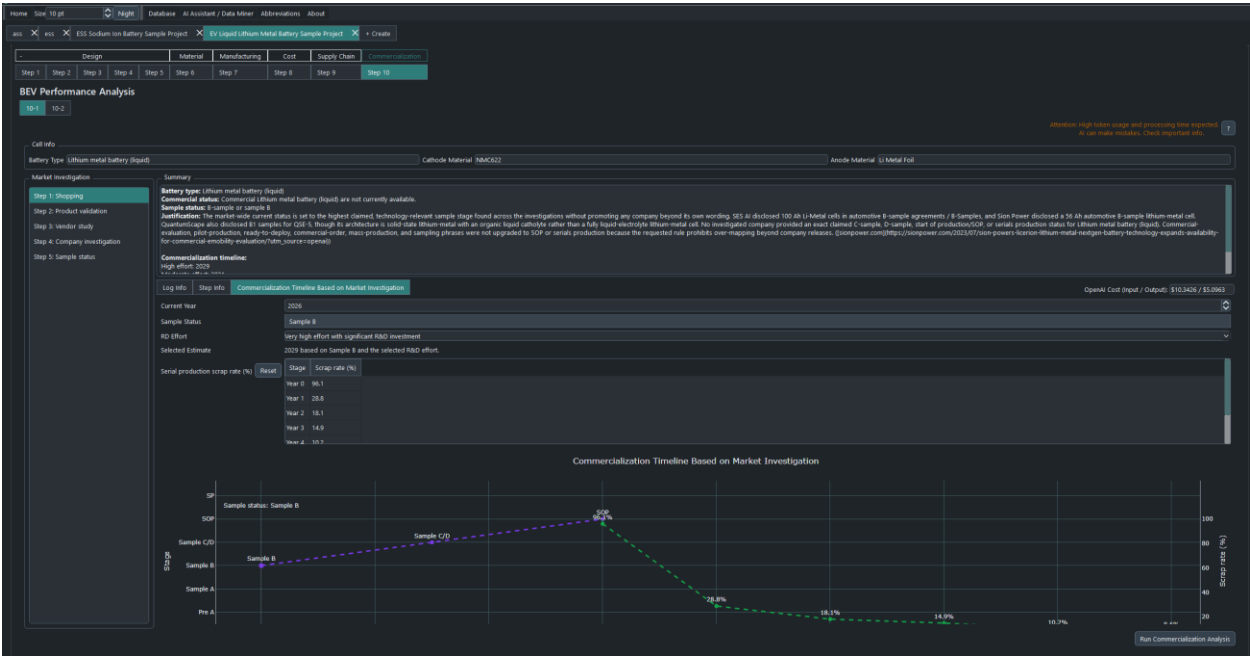
Company	Country	Products	Commercial status	Cathode / anode	Electrolyte	Manufacturing	Investment / Financials	Applications / customers	Sources
Shenzhen Beel Techno...	China	Name: B-40 Stack 1.5 10Ah Prose... Form Factor: 18650 Cycle Life: 1000 cycles @ 0.5C Safety Features: PFA enclosure, EU L... Commercialization Status: Alibaba L...	Alibaba listed com...	Cathode: Sodium ion catho... Anode: Hard carbon, stat...	Liquid electrolyte impl...	Locations: Shenzhen, Guangdong ... Scale: Pack assembly: sodium ion ...	Not available	Applications / Customers: Resident... Off-grid and on-grid home ESS	https://www.alibaba.com/product-det... https://www.beeltechno.com/about-us
Henan Zhongwei New E...	China	Name: xsmee 210 40 V Sodium ion ... Form Factor: 18650 Cycle Life: 6000 cycles @ 0.5C Safety Features: Built-in BMS, 3-year ... Commercialization Status: Alibaba L...	Alibaba listed com...	Cathode: Sodium ion catho... Anode: Hard carbon, stat...	Liquid electrolyte impl...	Locations: Beihuan Battery manufac... Scale: Pack manufacturer: sodium io...	Not available	Applications / Customers: Household... Pilot-scale backup Name Automotive and motorcycle starting Base station backup	https://www.alibaba.com/product-det... https://www.zhongweipower.com/prod... https://www.aifcolor.com/pw/storage-... https://emove.net/about/
Propow Energy Co., Ltd.	China	Name: Propow 24 V 100 Ah Deep-C... Form Factor: Rectangular enclosed ... Cycle Life: 1000 cycles Safety Features: CE,UN38.3,UN38.3 L... Commercialization Status: Alibaba L...	Alibaba listed com...	Cathode: Sodium ion catho... Anode: Hard carbon, stat...	Liquid electrolyte impl...	Locations: Guangdong, China Scale: Pack assembly: sodium ion ...	Not available	Applications / Customers: Marine R... RV Solar storage Yacht/camping car Boat Electric vehicles Wheelchairs	https://www.alibaba.com/product-det... https://www.propowenergy.com/about...
Esilport New Energy L...	China	Name: OEM/ODM Hise 3 V 10 Ah S... Form Factor: Cylindrical 18650 x 14... Energy Density: About 111 Wh/kg R... Cycle Life: 1000+ cycles Safety Features: ventless, anti-sho... Commercialization Status: Alibaba L...	Commercial produ...	Cathode: Layered transiti... Anode: Hard carbon, stat...	Liquid electrolyte impl...	Locations: Shenzhen, Guangdong ... Scale: OEM/ODM cat and pack sal...	Not available	Applications / Customers: Energy s... Industrial management Backup power Renewable integration Electric devices	https://www.esilportpower.com/hise-3... https://www.esilportpower.com/about...
QGSolarStore	United States	Name: 32140 Sodium ion Battery Ce... Form Factor: Cylindrical 32140 cell Energy Density: 110 Wh/kg above... Cycle Life: 1200 cycles to 80% SOH Safety Features: UN38.3 passed New... Commercialization Status: Retail co...	Retail commercial ...	Cathode: Layered oxide Anode: Hard carbon, stat...	Liquid electrolyte impl...	Scale: Retail/distribution only	Not available	Applications / Customers: EV com... E-bike and e-scooter packs Jump starters Marine/RV packs Off-grid solar storage Portable power stations DIY electronics	https://qgsolarstore.com/products/na...
Contemporary Ampere...	China	Name: First-generation CATL Sodi... Form Factor: Cell and pack platform	Industrialized used... Mass production L...	Cathode: Prussian white/... Anode: cathode: titani...	Liquid non-aqueous L...	Locations: Jiang Shaoxing China CATL production network in China	Investments: 202k CATL and Hbp...	Applications / Customers: Passenger... Heavy-duty trucks via dual power...	https://www.catl.com/en/news/663.html https://www.catl.com/en/news/6401.html

OpenAI Cost Input / Output: \$10.181 / \$10.205

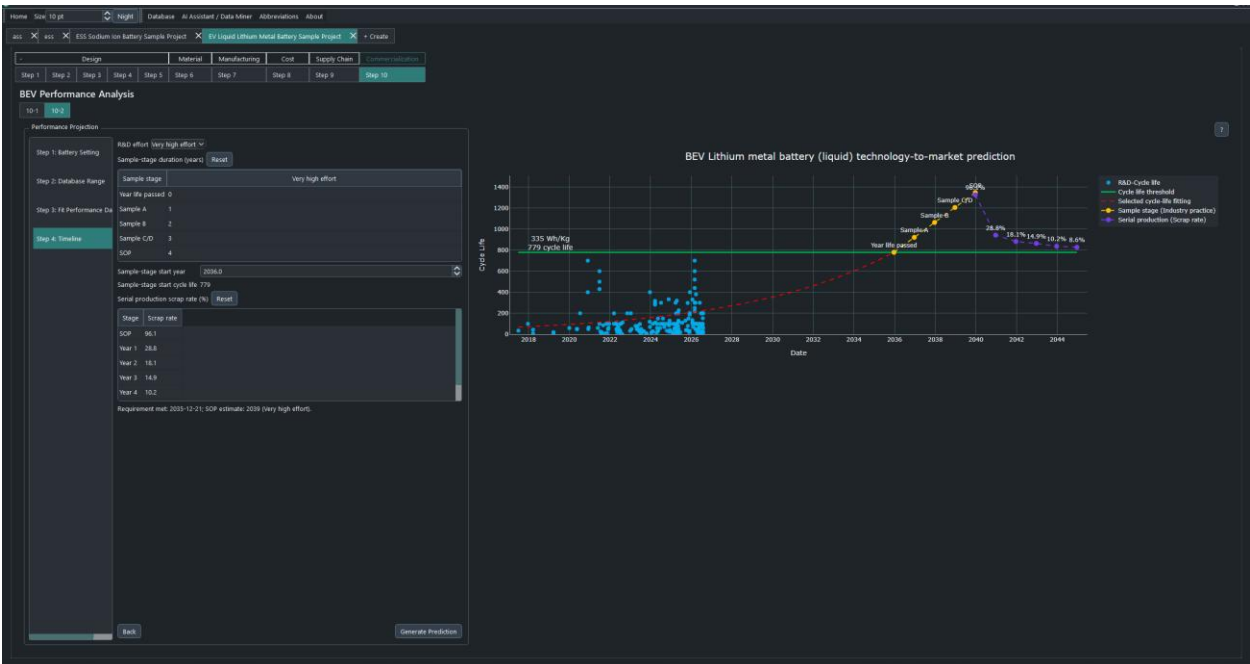
Attention: High token usage and processing time expected in case made mistakes. Check imported info.

Run Commercialization Analysis

2.10.2 If a battery technology is not commercialized, COSTIME will do commercialization timeline estimation based on Market investigation.



2.10.3 If a battery technology is not commercialized, COSTIME will do commercialization timeline estimation based on Battery performance database provided in COSTIME.

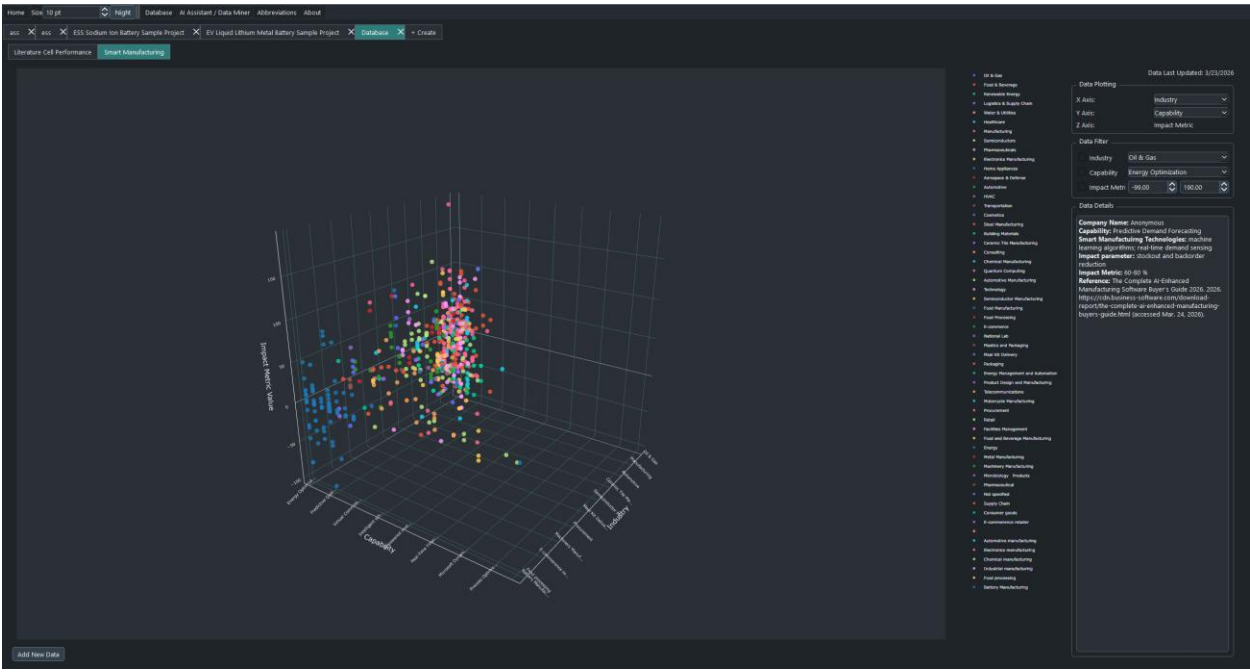


3 Database

3.1 >600 pouch cells database from published paper, report, online resources. All cited and validated.

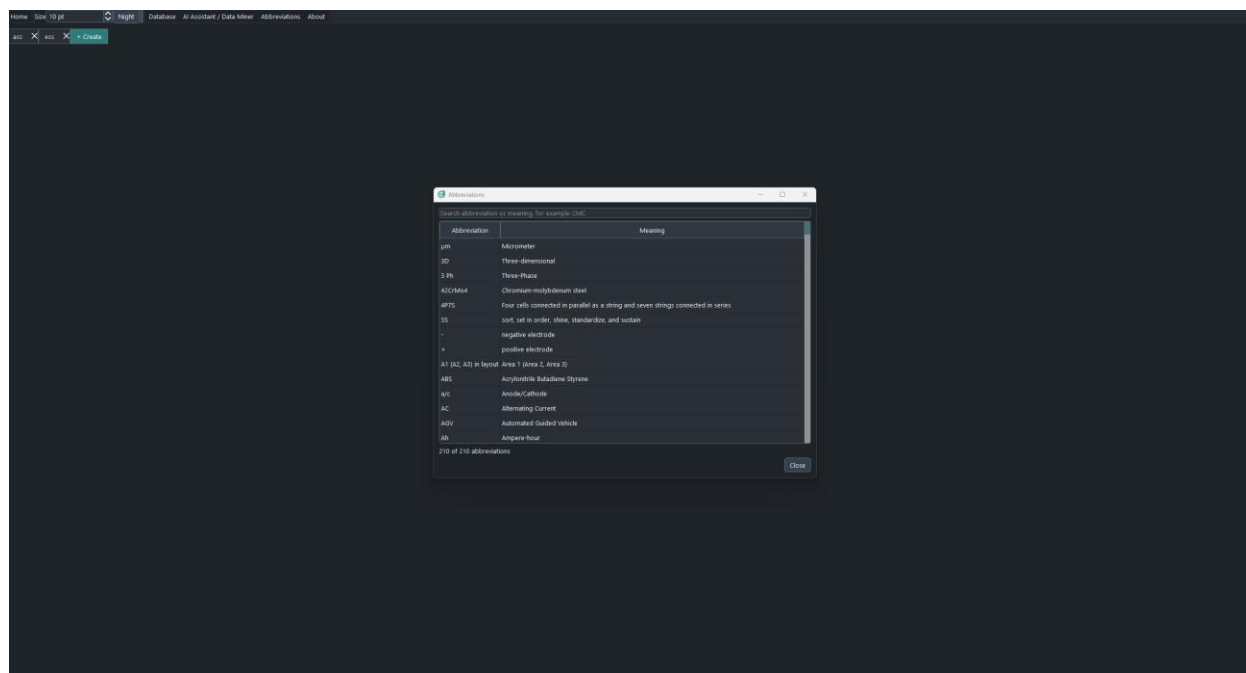


3.2 >500 data points about smart manufacturing practice of different industries. All cited and validated.

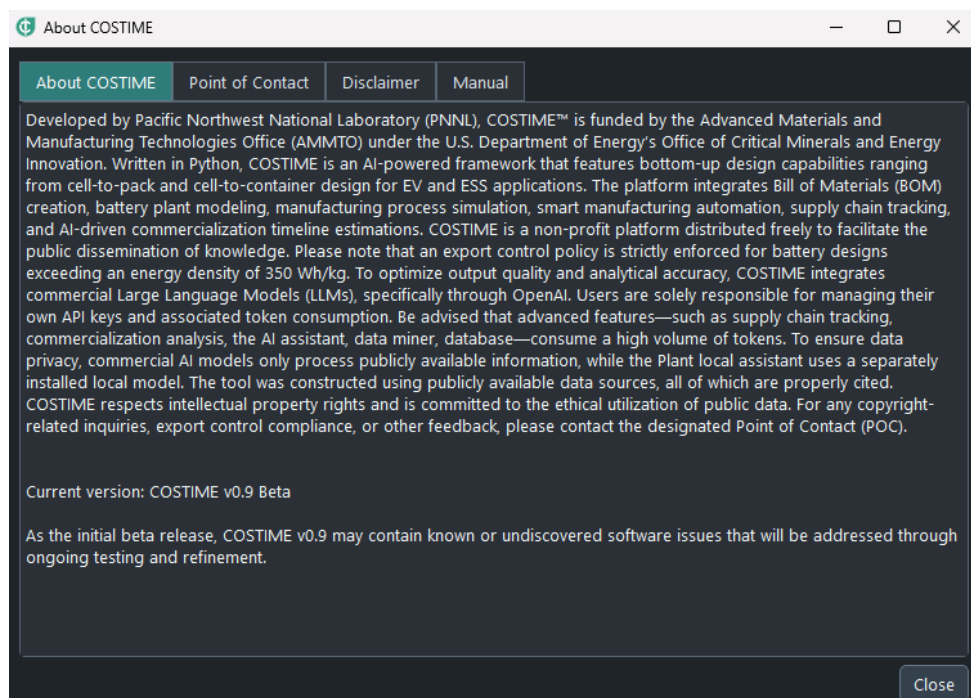


4 Menu Bar. Reach database, AI assistant/Data Miner, Abbreviations and software info.

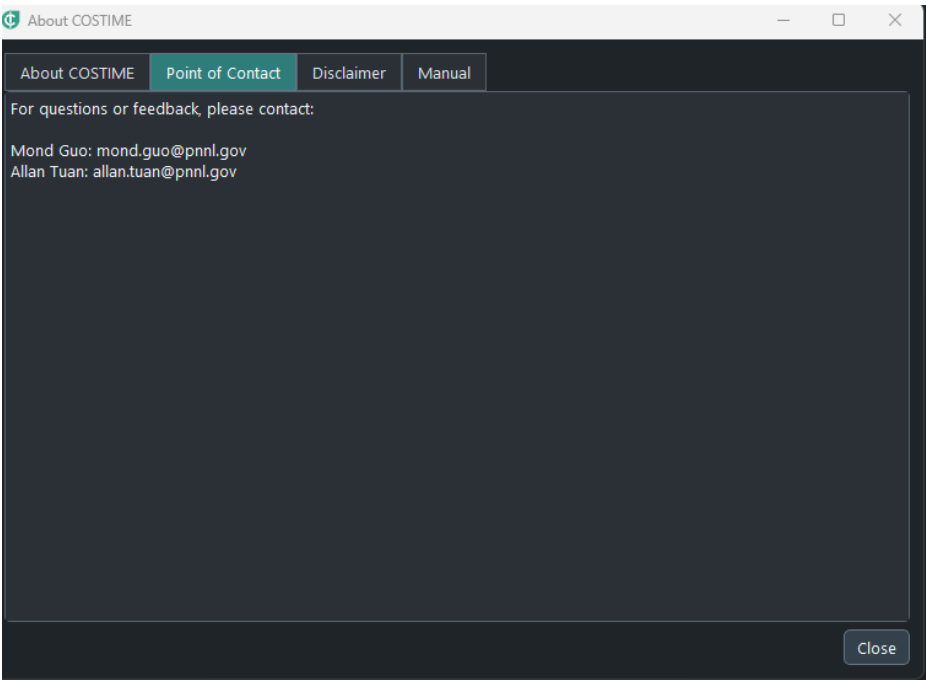
4.1 Reach all abbreviations and units in COSTIME.



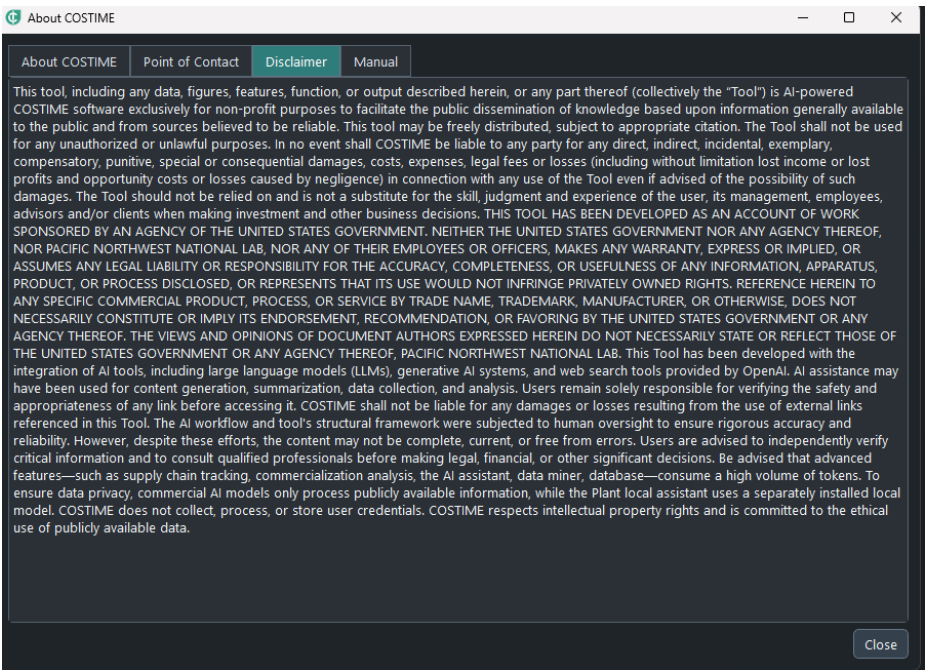
4.2 Reach software information in About



4.3 Reach POC



4.4 Reach Disclaimer



4.5 Reach Manuals

