

# 冰水主機智慧節能減碳 解決方案



--Altair代理商  
專案雲有限公司--



# 專案雲有限公司簡介

- Altair在台代理商
- AI顧問/領域專家
- ESG智慧節能減碳減廢整合系統解決方案供應商
- 有機物碳化暨發電設備解決方案供應商

- E: 減少碳排、淨零永續
- S: 賦能員工、提升組織競爭力
- G: 資訊透明、落實公司治理

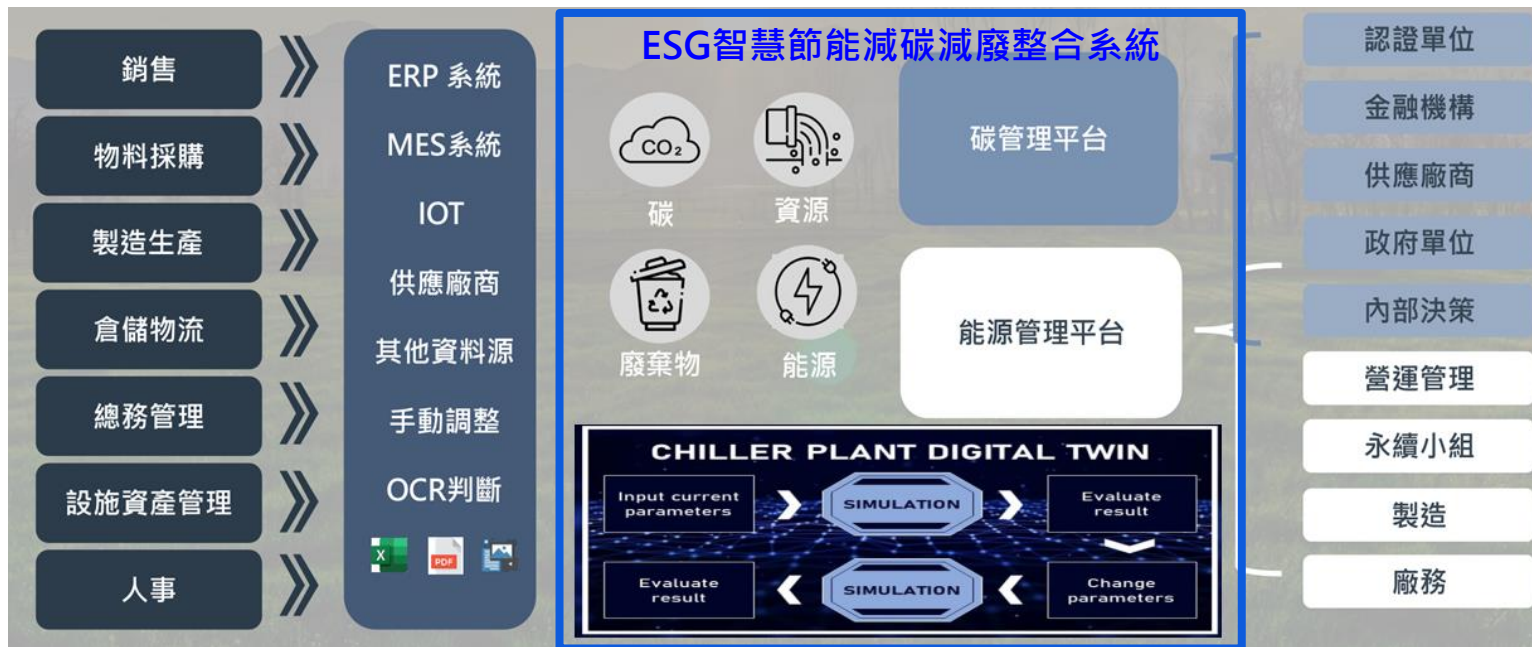
- E: 先進生產規劃與控制
- S: 製程參數分析與優化
- G: 成本檢核與決策支援

- E: 冰機運轉優化
- S: 設備/產品維修建議
- G: 高單價配件採購評估



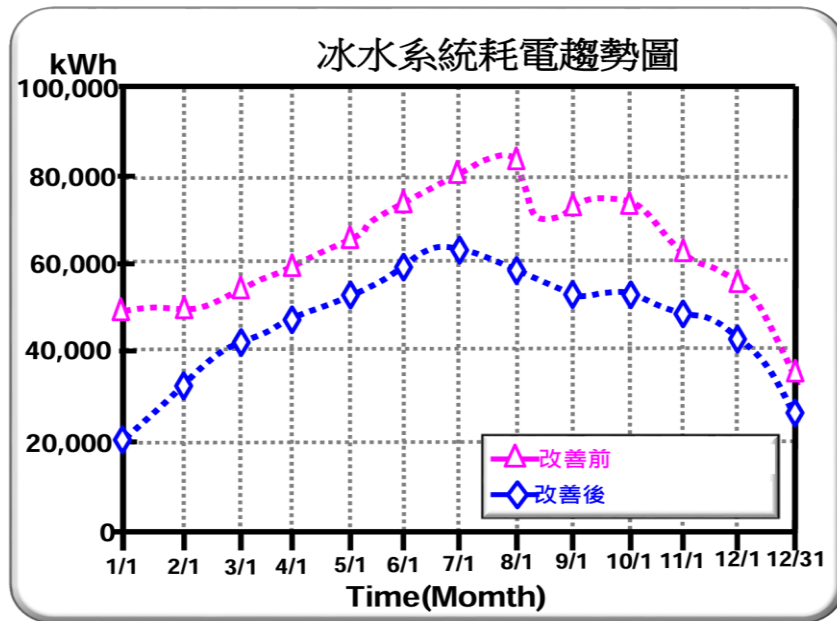
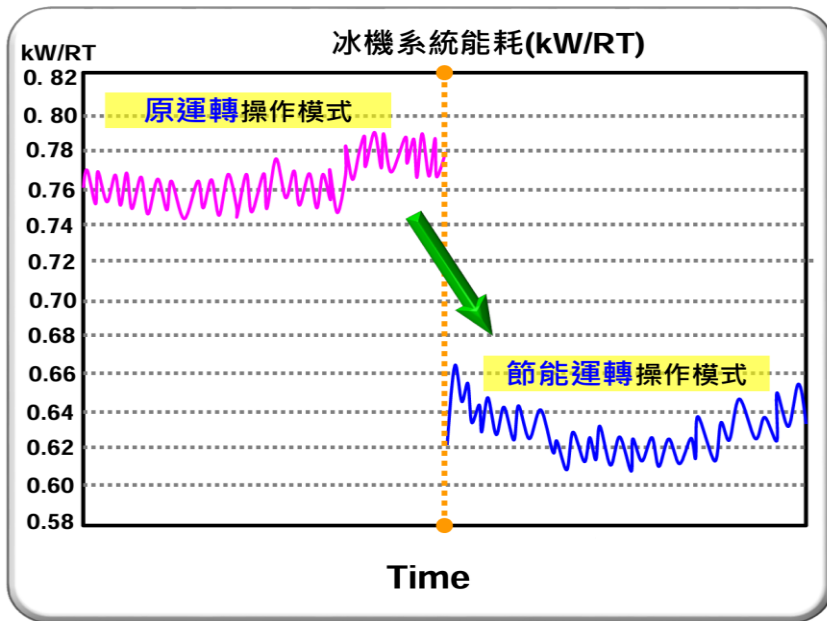
# ESG智慧節能減碳減廢整合系統

- 節能減碳(半導體廠、光電面板廠冰水系統數位分身智慧節能減碳解決方案)
- 廢水減排(半導體廠務廢水處理之AI大數據分析與智能調度決策解決方案、有機廢棄物碳化暨發電設備解決方案)



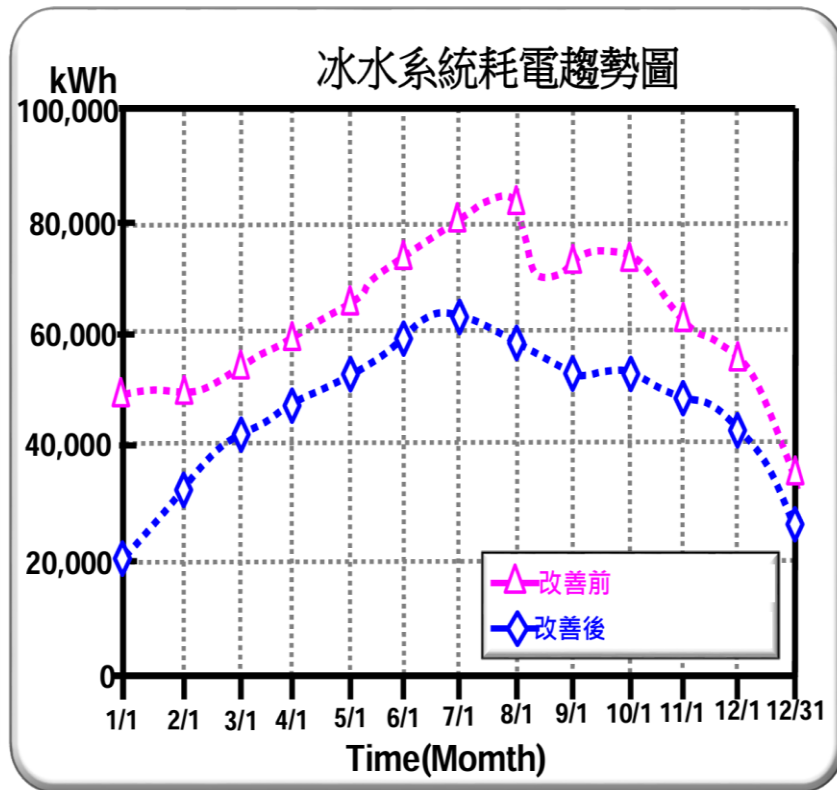
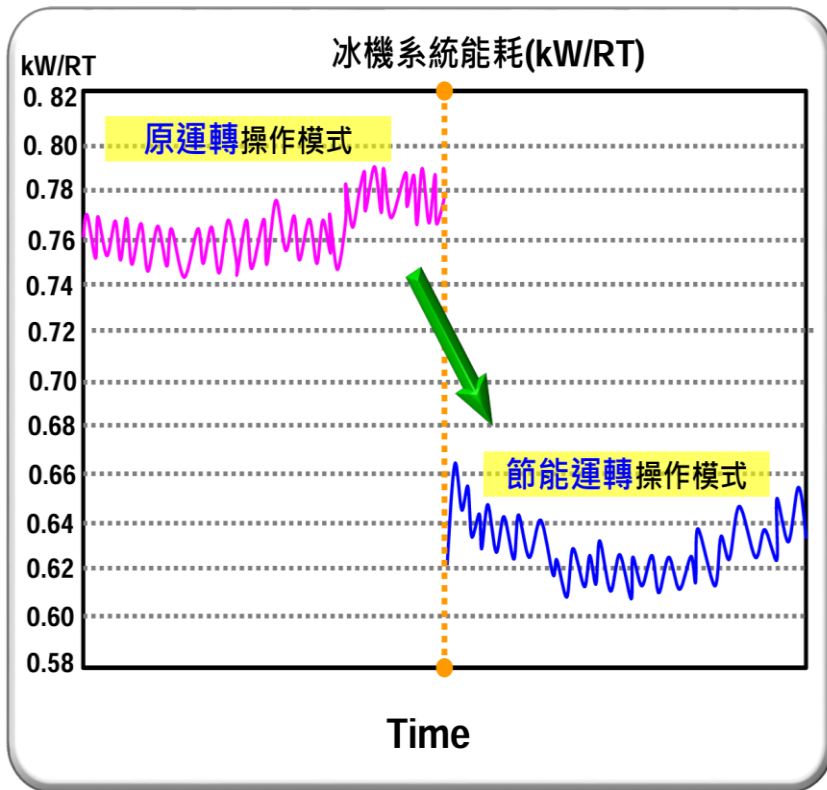
# 實績1：光電面板廠冰水系統智慧節能減碳效益

- 每日可節能1014.5 kWh
- 每日可減碳535kg
- A廠每年可節費NT\$2,000,000 (730,000+1,270,000)
- B廠每年可節費NT\$1,430,000 (1,170,000+260,000)

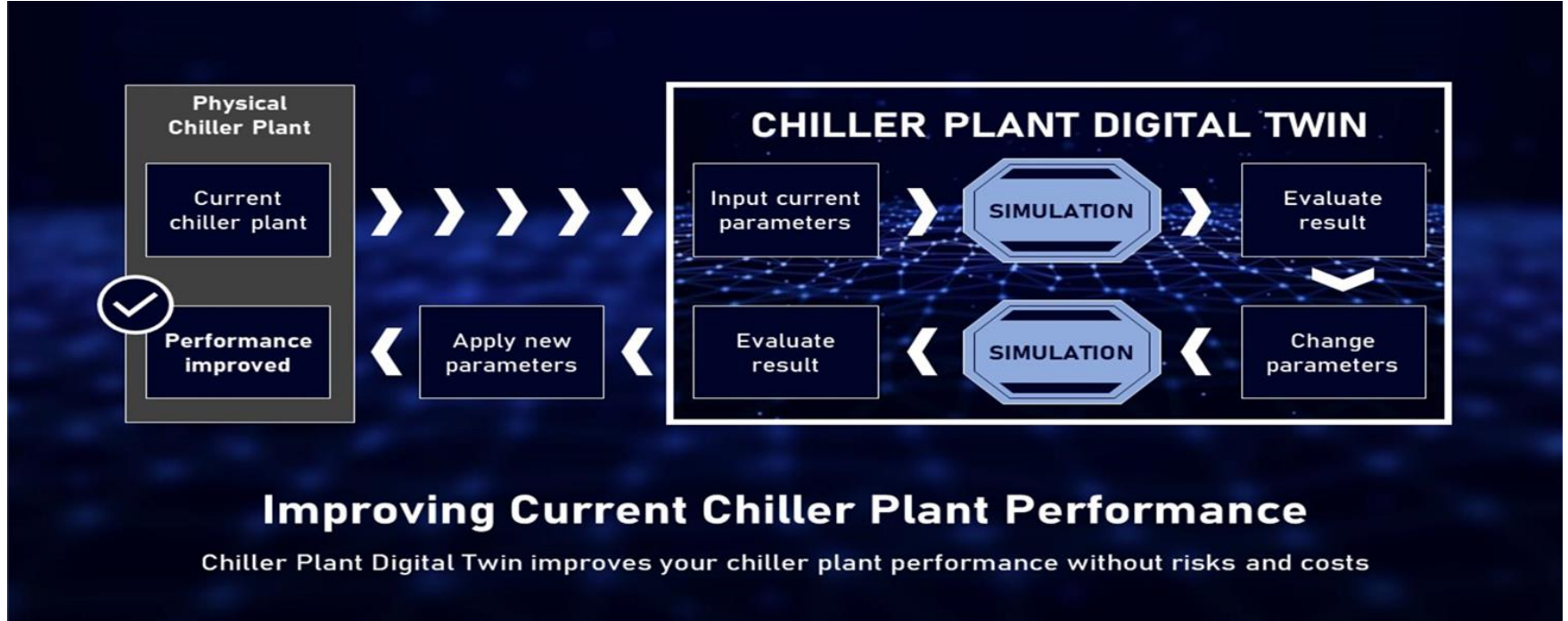


# 實績2：半導體廠冰水系統智慧節能減碳效益

- 每年可減碳385噸

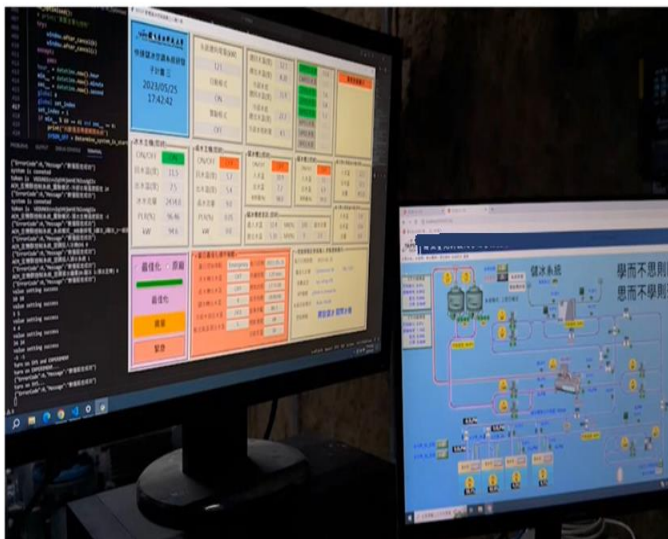


# 冰水系統數位分身智慧節能減碳解決方案



# 實機展示

- 半導體廠：智慧節能預測(Simulation)後通報執班人員，由人為判斷是否開關冰機/泵/儲冰系統
- 光電面板廠：後反饋(自動控制)：智慧節能預測達開關冰機/泵/儲冰系統的條件時，會自動傳送動作指令(Change Parameters)進行開關(已考慮安全開關的延時)



後反饋(自動控制)：  
自動關閉冰機/泵  
自動開啟儲冰系統  
耗能從63kw快速下降至25kw

# 以熱負荷預測為例(冷凍噸需求預測模型)

程式開始

收集資料

數據預處理

The screenshot displays the RapidMiner Studio interface with a workflow titled "Load and Process Data" in the "Process" view. The workflow consists of the following operators:

- Retrieve Data:** Load data.
- Create Single Row o...:** Creates a single row version of the data which can be used in deployments.
- Preprocessing:** All general preprocessing steps (which do not have an effect on validation) happen inside this operator - double click on it.
- Filter Examples:** Model on cases with label value, apply the model on cases with a missing for the target column.
- Sample:** Creates a sample of the data if necessary to guarantee that this process will finish with reasonable runtimes and without memory issues.
- Remember:** Remember the labeled data.
- Remember (2):** Remember the unlabeled data.

The interface also shows a "Repository" panel on the left with various data sources and models, and a "Parameters" panel on the right for the "Load and Process Data (Subprocess)" operator, which currently has no parameters to display. A "Help" panel at the bottom right provides a synopsis for the "Subprocess" operator.



# 以熱負荷預測為例(冷凍噸需求預測模型)

ExampleSet (/chiller\_auto\_model/HVAC Energy Data Temp 42606)

ExampleSet (/chiller\_auto\_model/HVAC Energy Data Temp 61949)

ExampleSet (/chiller\_auto\_model/HVAC Energy Data Temp 69467)

LinearRegression (Linear Regression)

ExampleSet (/chiller\_auto\_model/HVAC Energy Data Temp 99602)

Result History

ExampleSet (Select Attributes)

ExampleSet (Cross Validation)

PerformanceVector (Performance)

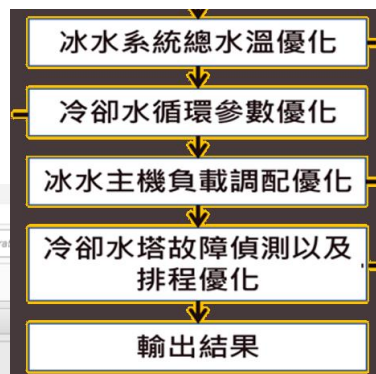
Open in Turbo Prep Auto Model

Filter (13,615 / 13,615 examples): all

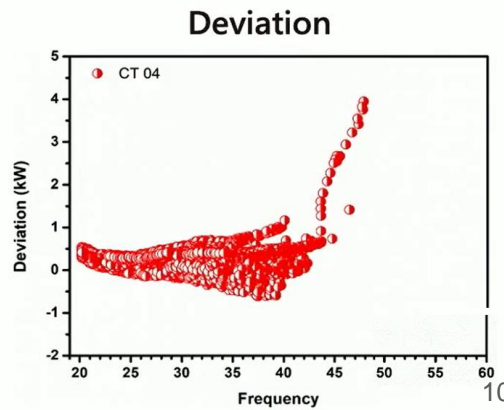
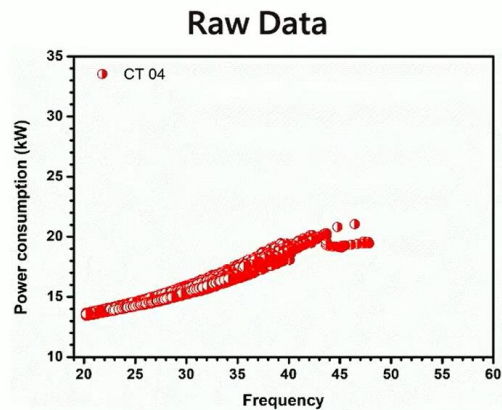
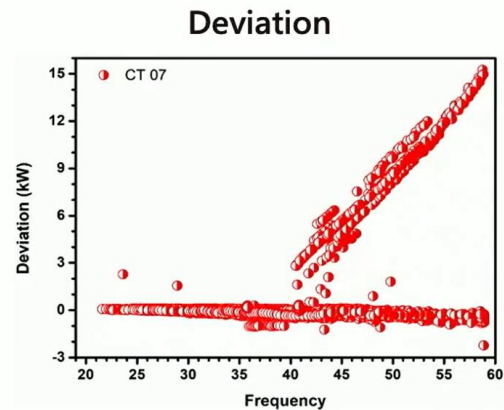
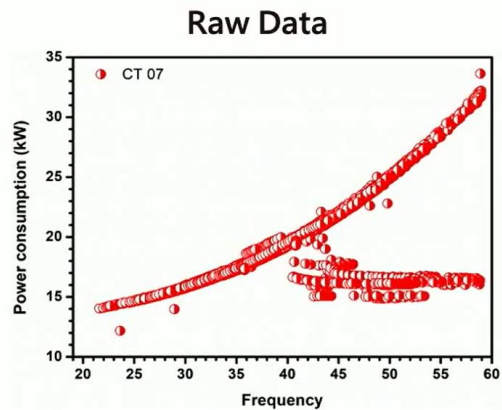
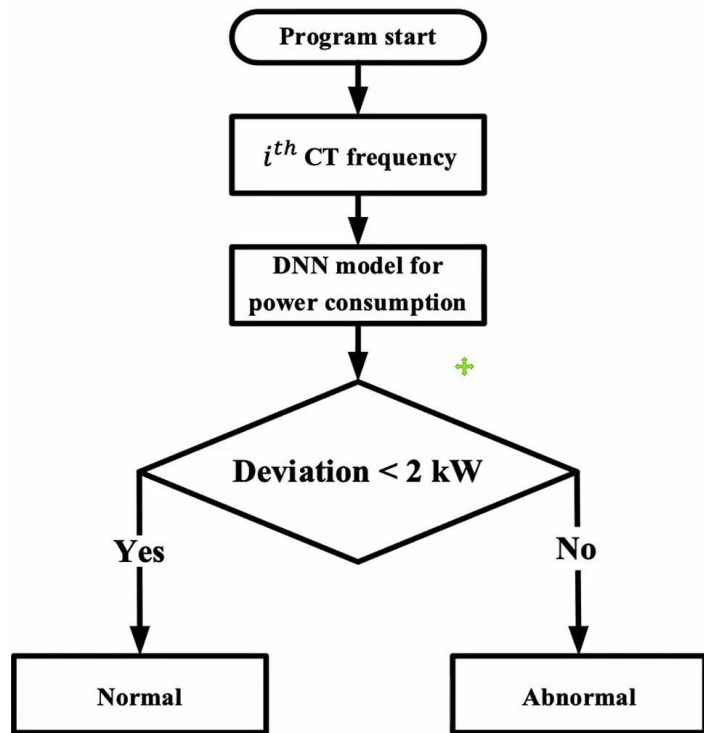
Row No.	Building Load (RT)	prediction(Building Load (RT))	Local Time (...)	Chilled Wat...	Cooling Wat...	Chiller Ener...	Outside Te...
15	743.100	728.358	Aug 21, 2019	119.400	31.700	208.600	90
16	704.400	691.099	Aug 21, 2019	117.200	31	193.300	88
17	593.100	559.632	Aug 21, 2019	101.200	29.700	150.800	86
18	545.600	465.921	Aug 21, 2019	86.500	30.900	115	84
19	528.400	479.786	Aug 21, 2019	93.900	31.300	113.800	84
20	560.200	518.696	Aug 21, 2019	95.100	32.600	127	84
21	707.400	680.349	Aug 22, 2019	115.100	31	191.900	84
22	727.700	705.993	Aug 22, 2019	116	31.400	198	84
23	746.600	727.077	Aug 22, 2019	117.100	31.800	207.600	86
24	557.500	531.176	Aug 22, 2019	93.700	33.100	129	84
25	571	548.153	Aug 22, 2019	96.600	33.200	133.300	84
26	489.400	462.313	Aug 23, 2019	89.500	31.700	108.400	82
27	722.800	702.956	Aug 23, 2019	116.100	31.500	199.100	88
28	612.300	579.722	Aug 24, 2019	103.900	33.100	139.700	84
29	512.100	468.665	Aug 24, 2019	90.800	30.700	107.100	84
30	507.800	484.576	Aug 24, 2019	93.100	31	109.100	82
31	440.700	434.310	Aug 25, 2019	82.900	30.300	105.400	82
32	562.700	517.908	Aug 25, 2019	95	32.100	124.500	84
33	534.200	496.546	Aug 25, 2019	96.900	31.600	116.100	82
34	710.700	704.362	Aug 26, 2019	116.100	31.700	202.600	88
35	705.300	673.209	Aug 26, 2019	114.900	30.600	189	88

Repository

- Training Resources (connected)
- Samples
- Community Samples (connected)
- chiller\_auto\_model (Local)
- Local Repository (Local)
- Connections
- Akila Project
- Alpha Vantage API for Financial Market data
- AutoML
- Book
- Chiller
  - data
  - process
    - chiller-auto-model ( 5/10/23 8:40 PM - 323 kB)
    - chiller\_energy\_saving ( 5/5/23 4:03 AM - 735 bytes)
    - RT-Estimation-All-Variables ( 5/11/23 7:00 AM - 8 kB)
    - RT-Estimation-Bootstrapping-Validation ( 5/11/23 7:04 AM - 8 kB)
    - RT-Estimation-K-Fold-CV ( 5/11/23 6:40 AM - 8 kB)
- CREDIT RISK MODELING
- Credit-Card-Fraud-Detection
- data
- Fraud-Detection-Handbook
- IBM HR TURNOVER
- MIT
- power\_consumption
- processes
- Python Integration
- SIMULATION MIT
- SMS
- titanic
- Tukey API
- DB (Legacy)



# 冰水系統預測性維護解決方案：



# 以能耗預測模型為例(超過閾值判定異常 展開預測性維護)

程式開始

收集資料

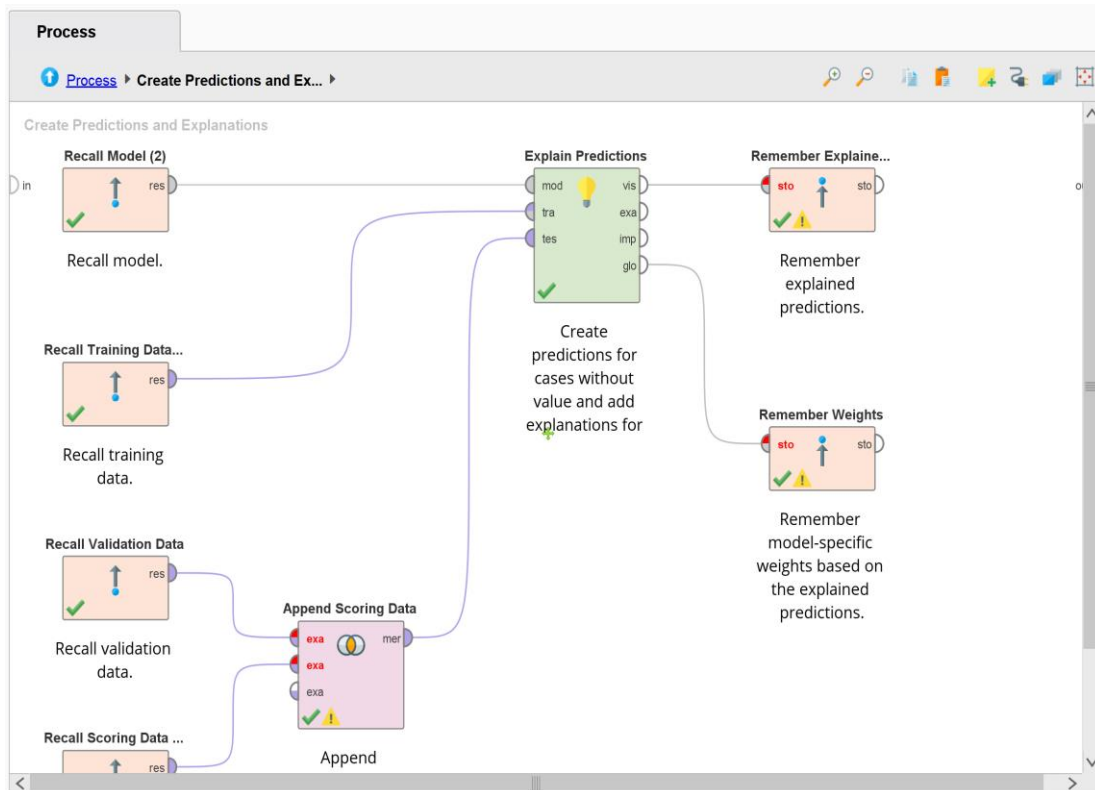
數據預處理

The screenshot displays the RapidMiner Studio Educational 10.3.000 interface. The main workspace shows a workflow titled "Load and Process Data" with the following steps:

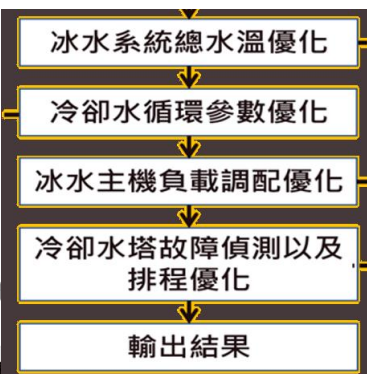
- Retrieve Data**: Load data.
- Create Single Row o...**: Creates a single row version of the data which can be used in deployments.
- Preprocessing**: All general preprocessing steps (which do not have an effect on validation) happen inside this operator - double click on it.
- Filter Examples**: Model on cases with label value, apply the model on cases with a missing for the target column.
- Sample**: Creates a sample of the data if necessary to guarantee that this process will finish with reasonable runtimes and without memory issues.
- Remember**: Remember the labeled data.
- Remember (2)**: Remember the unlabeled data.

The interface includes a Repository panel on the left with a search bar and a list of operators categorized by function (e.g., Data Access, Blending, Cleansing, Modeling, Scoring, Validation, Utility, Extensions, Deployment). A Parameters panel on the right shows "Load and Process Data (Subprocess)" with no parameters to display. A Help panel at the bottom right provides details for the "Subprocess" operator, including its tags and a synopsis.

# 以能耗預測模型為例(超過閾值判定異常 展開預測性維護)



## Deep Learning - Prediction



Row No.	KWperTon	prediction(		
229	0.500	0.512	38.900	55.100
230	0.510	0.513	38.900	54.700
231	0.500	0.496	38.800	54.700
232	0.500	0.512	39	54.400
233	0.490	0.502	38.900	54.500
234	0.500	0.512	39	54.500
235	0.520	0.523	39	55.100
236	0.530	0.530	38.900	55
237	0.540	0.527	39	55.100
238	0.550	0.530	38.900	55.100
239	0.520	0.535	39	55.100
240	0.520	0.527	38.900	55.100
241	0.540	0.535	38.900	55.200

# 碳管理平台整合

透過輸入活動詳情，或是結合原有ERP資訊，完整記錄組織碳盤查、即時管理各熱點排放設備。

The screenshot displays a web application interface for carbon management. On the left is a navigation menu with items like '組織溫室氣體', '活動詳情', and '組織管理'. The main area is titled '活動詳情' (Activity Details) and contains a table of activity records. A modal window titled '新增活動詳情' (Add New Activity Details) is open, showing a form with fields for '活動時間' (2022/10/20), '廠區' (吳江總廠), '類別' (直接溫室氣體排放和移除), '子類別' (移動式燃燒), and '設備' (交通車). A dropdown menu is open under '設備', listing options such as '交通車', '推車', '搬運車', '自用飛機', '自用船運', and '10輪大卡車'. The background shows a table with columns for '排放源/燃料種類' and '活動數據', listing various energy sources and their corresponding values.

排放源/燃料種類	活動數據
排電自發自用	110.000C
自產煤	10.000C
一般電力(台電)	220.000C
一般電力(台電)	1000.000C
一般電力(台電)	300.000C
廢料煤	38.000C
國際海運(燃料油動力)	1000.000C
國際海運(燃料油動力)	20000.000C
原料煤	1000.000C
國際海運(燃料油動力)	6000.000C

組織溫室氣體盤查

圖表報告

活動詳情

年度目標

產品碳足跡

生命週期評估

碳資產

系統管理

廠區管理

成員管理

## 圖表報告

Welcome back!

CO<sub>2</sub>e 年度累積排放量(ton) 2,624

本月排放量(ton) 328  
與上個月相比 -87%

看單次總量 看趨勢

2020年8月

新北八里廠

依類別

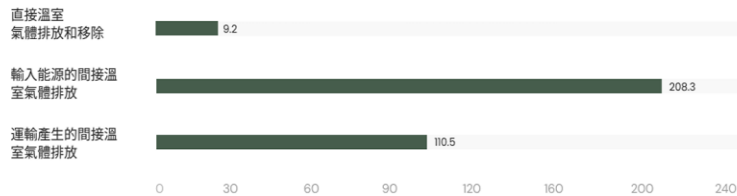
依子類別

依設備

依排放源/燃料種類

### 本月CO<sub>2</sub>e排放量

單位: TonCO<sub>2</sub>e/月



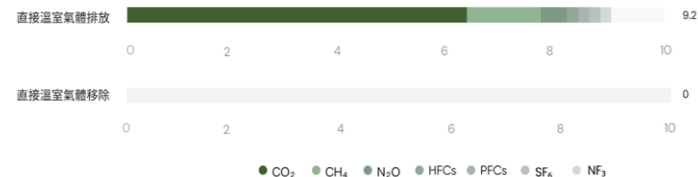
### 本月七大溫室氣體排放量

單位: TonCO<sub>2</sub>e

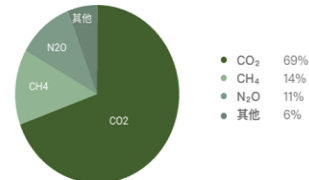
溫室氣體	排放量
CO <sub>2</sub>	226.8
CH <sub>4</sub>	46
N <sub>2</sub> O	37.6
HFCs	12
PFCs	2.6
SF <sub>6</sub>	0.8
NF <sub>3</sub>	2.2

### 直接溫室氣體排放 & 移除

七大溫室氣體



### 圓餅圖



# 碳管理平台整合

## 原物料

以噸為單位 CO<sub>2</sub>e



163,925

68.4 %

直接用於生產自己產品的採購材料的二氧化碳排放量。

## 運輸(進向物流)

以噸為單位 CO<sub>2</sub>e



30,512

12.7 %

從購買原物料的原產地運輸到使用它們的工廠所產生的二氧化碳排放量。

## 能源/耗用

以噸為單位 CO<sub>2</sub>e



11,037

4.6 %

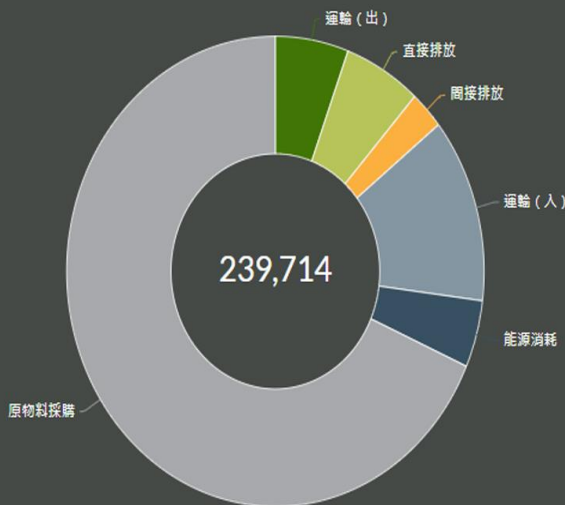
二氧化碳排放與生產產品過程中，加工步驟的能源消耗有關。

## 碳足跡

以噸為單位 CO<sub>2</sub>e



239,714



二氧化碳當量(CO<sub>2</sub> equivalent, CO<sub>2</sub>e)是指二氧化碳排放量與實際排放的溫室氣體具有相同的全球變暖潛力。這樣就可以對同一單元的不同排放進行比較。

顯示的總排放量反映了在一段時間內，售出的所有產品的排放量。

## 直接排放

以噸為單位 CO<sub>2</sub>e



14,316

6.0 %

直接由生產過程本身造成的二氧化碳排放，例如在生產工廠排氣口測量的排放。

## 間接排放

以噸為單位 CO<sub>2</sub>e



6,335

2.6 %

不能被分配到其他二氧化碳排放類別中的二氧化碳排放。

## 運輸(出向物流)

以噸為單位 CO<sub>2</sub>e



13,588

5.7 %

銷售貨物運輸到目的地(例如，客戶)的二氧化碳排放。

# 碳管理平台整合

- 概覽頁
- 國家視角
- 工廠視角
- 利潤中心視角
- 產品視角
- 產品工廠視角
- 碳成本
- 排名分析
- 碳足跡分析

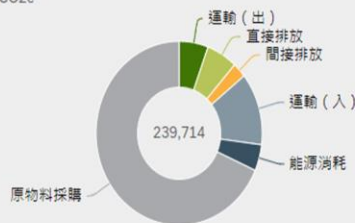
碳排放量  
以噸為單位 CO2e

239,714

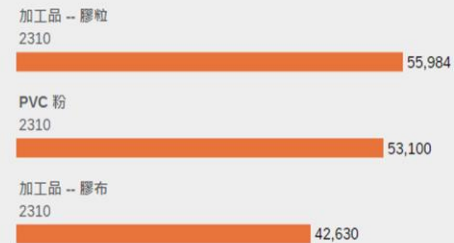
排放量變化趨勢  
以噸為單位 CO2e | ▲ Forecast



排放環節類型占比  
以噸為單位 CO2e

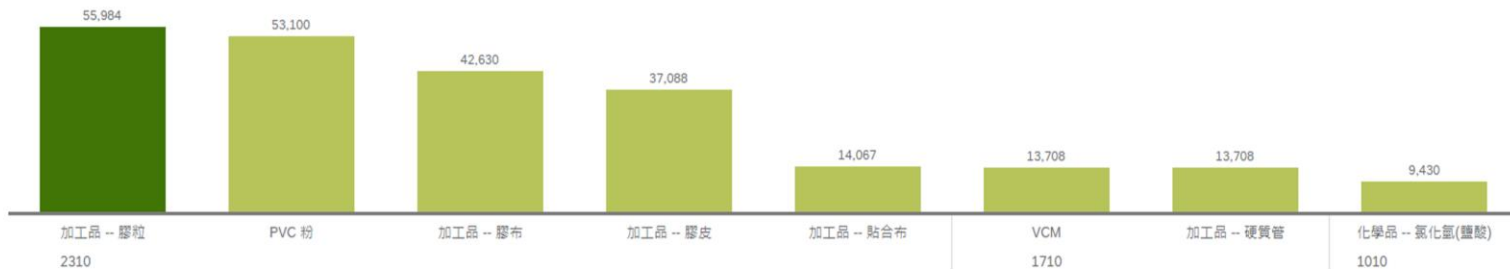


Top 3 排放 by 產品  
以噸為單位 CO2e



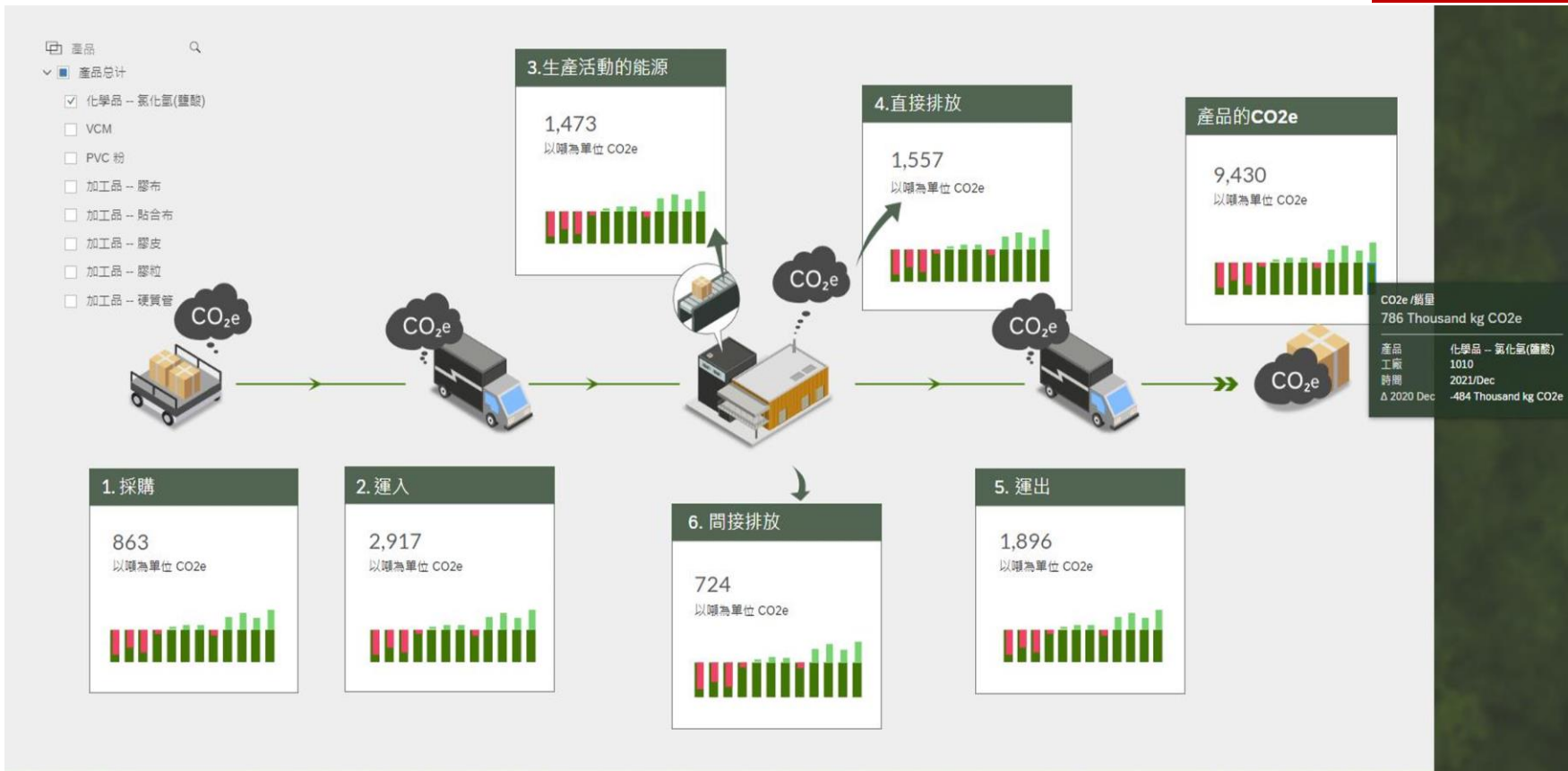
排放量 by 產品

以噸為單位 CO2e | [Explorer Available](#)





# 碳管理平台整合



# 碳管理平台整合

碳盤查平台填寫介面	<ul style="list-style-type: none"><li>-盤查填寫系統於戶端上線啟用</li><li>-活動詳情輸入</li><li>-excel template 匯入</li></ul>
盤查清冊產出功能	<ul style="list-style-type: none"><li>-ISO 14064-1 : 2018 各廠區清冊產出功能</li><li>-環保署溫室氣體盤查清冊</li><li>-金管會碳排放揭露要求</li></ul>
目標管理	<ul style="list-style-type: none"><li>-管理減碳領域，進度追蹤</li><li>-趨勢圖及達成率總計</li><li>-與去年碳排放量比較</li></ul>
碳排放可視化功能	<ul style="list-style-type: none"><li>-總量與趨勢多維度dashboard-設備、廠區、時間、類別</li><li>-與MES串接(客製化項目，費用另計)</li><li>-客製化報表 (如:不同工序之視角)費用另計</li></ul>
導入服務與教育訓練	<ul style="list-style-type: none"><li>-IT環境建置</li><li>-線上操作指引教材</li><li>-線上教育課程 4hr</li></ul>
系統定期維護	<ul style="list-style-type: none"><li>-每季定期維護</li><li>-當環保署法規及係數庫更新時，系統配合即時提供</li></ul>

# 軟體開發及機器學習碳足跡整合

Project :

- Default Project
- Federated learning
- API Code Carbon
- API Code Carbon
- DataCenter
- Demo NCEO
- Test Code Carbon



386.43 %

of an american household weekly energy consumption



1517

miles driven



2 hours

of TV

Experiments emissions

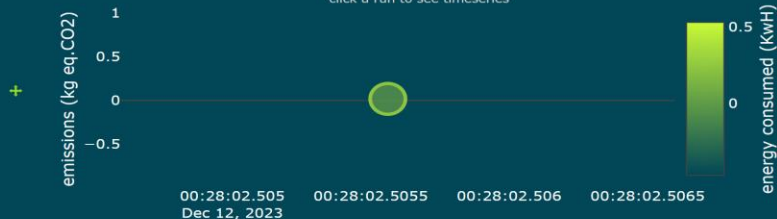
click a bar to filter bubble chart on the right side



Code Carbon user test

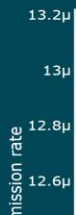
Code Carbon user test

click a run to see timeseries



fe77602d-53ec-42b7-8924-546728de223f

emissions rate (Kg eq. CO2 per second)



Metadata

O.S.	Windows-10-10.0.22631-SP0
Python Version	3.11.5
Number of C.P.U.	24
C.P.U. model	12th Gen Intel(R) Core(TM) i9-12900HX
Number of G.P.U.	1
G.P.U. model	1 x NVIDIA GeForce RTX 3080 Ti Laptop GPU
Longitude	121.5
Latitude	25.1



# THANK YOU

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