

Power Management System (PMS): *Local infrastructure control with Inview*

Break-out - Session 1

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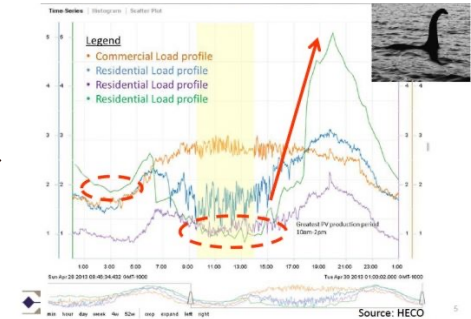
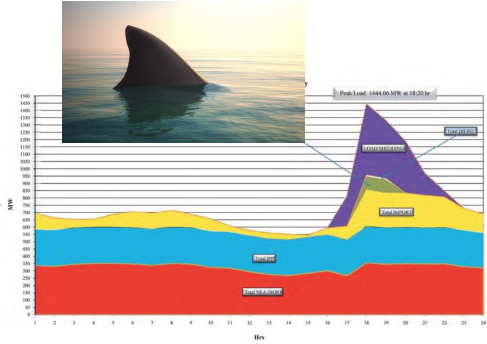
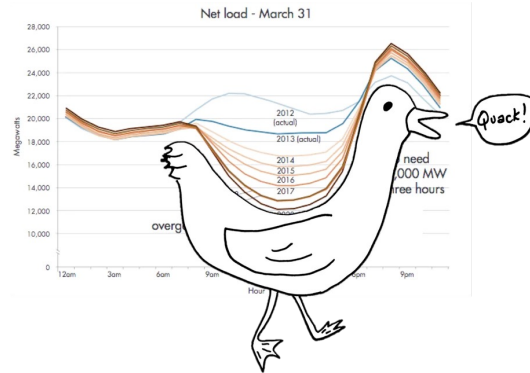
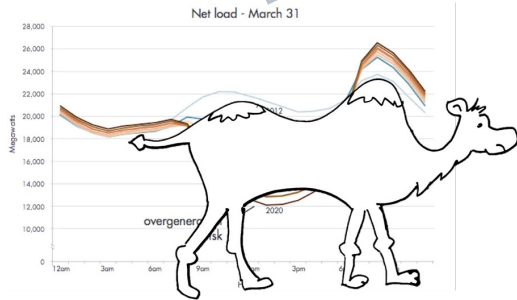
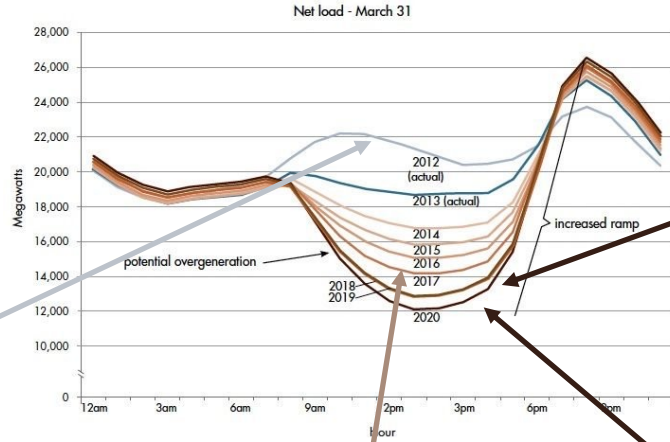
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Belgium, Luxembourg, China, India,
United States, United Kingdom, France,
Germany, United Arab Emirates, Russia,
Malaysia, Australia.



An animal ?



Power management offers optimized and resilient electricity usage

- Context
- CE+T Solution
- Capabilities insight
- Product offer
- Road map
- Customization

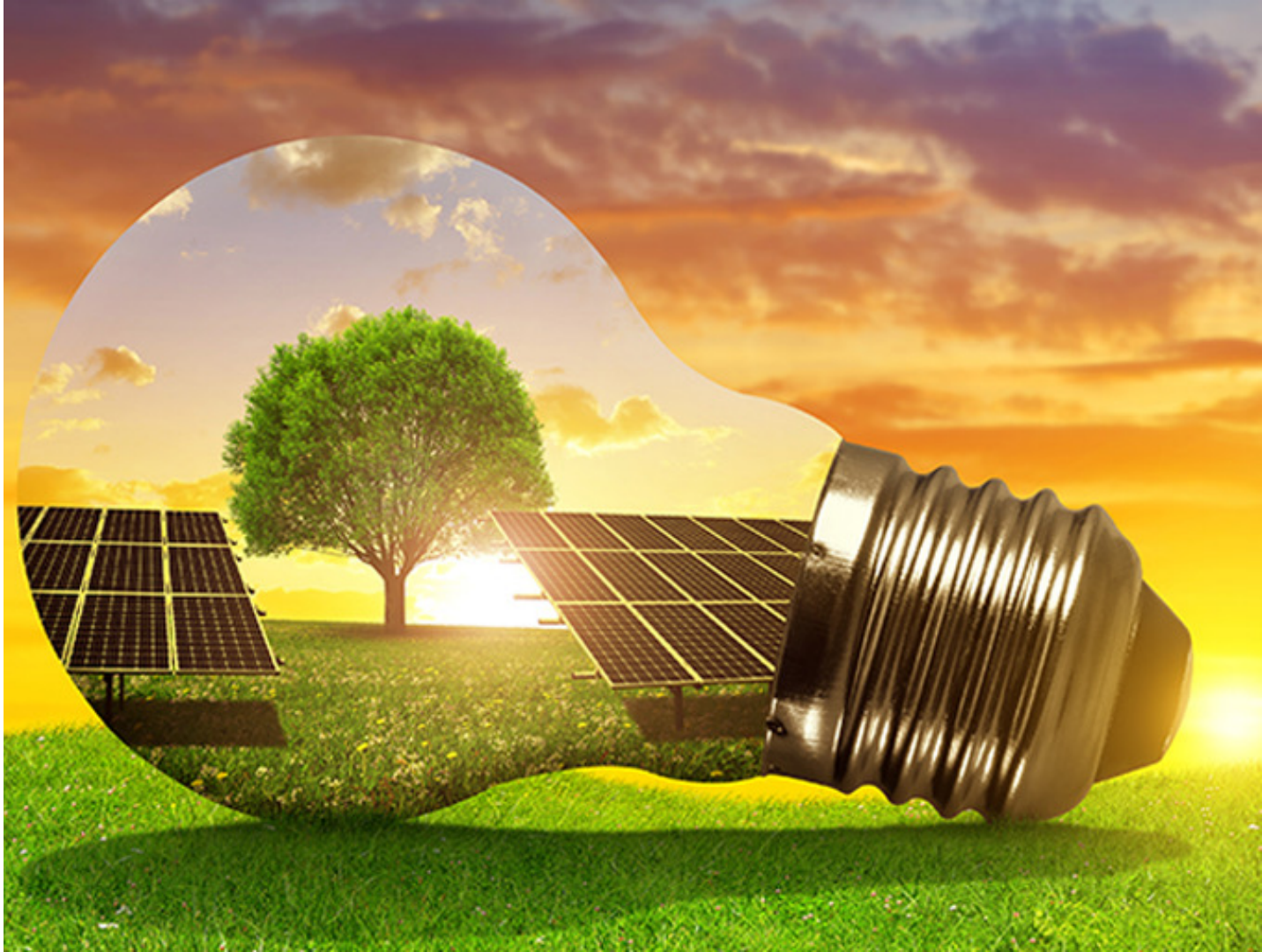
CONTEXT



Climate change crisis

Energy transition

- Raise of **Non-dispatchable Energy** sources
- Energy production & market **decentralization**
- Increasing **bidirectional Power Flow** on Electrical Grid
- Increasing pressure on **Grid system Operator**





Society electrification

- Raise of **Electric Vehicles**
- Move to **heat pump**

But also...

5G deployment

- Raise of **connection points**
- Increasing need for **Secured Power Distribution**
- Raise of **safety** constraints
- Increasing need for **Edge computing**
- Pressure to become **actor of Energy Transition**





Consequences

- Under pressure **Grid infrastructures & System Operators**
- Need for **Enhanced local control** @ 'sub-system' level

CE+T SOLUTION

Power Management System

- Ensure system **stability**, **safety** and maximum **availability** whatever the conditions
- Allow power flow **optimization**
- Follow predetermined “static” **rules/policies** or “dynamic” control (EMS)
- Embedded into **INVIEW** system **controller**



Set of capabilities

- From **basic** to **advanced**
- In use **for years** or **to be developed**
- Related to system **topology**
- Differing from **level of execution** (controller vs converter level)
- Requiring **accessories** or not
- Used **independently** or **combined**
- Submitted to **priorities**

Control a set of components (ecosystem)

- CE+T Power **converters**
 - Sierra 25 – 48 & 380
 - Hercules
 - Stabiliti
 - Iris
- Third party **converters** & **components** (interfaced or not)
 - PV inverters & chargers, rectifiers, etc.
 - Batteries, sources, etc.
- **Ancillaries**: meters, contactors, etc.

SOME CAPABILITIES...

From input control in TSI time...

- Source **priority**
- **Walk-in** mode

The screenshot displays the CET POWER web interface with two configuration windows. The top window shows the 'Source power ratio DC vs AC (%)' parameter, and the bottom window shows the 'Walk In Mode Time (x10 s.)' parameter. Both parameters are highlighted with red boxes.

Parameter ID	Parameter Name	Value	Description
96	Source power ratio DC vs AC (%)	0 to 100	Defines the priority source. Default value is "0" 0 - Feeding from AC IN has priority (Inverter AC/AC - EPC mode) 100 - Feeding from DC has priority (Inverter DC/AC - On Line mode)
106	Other;Walk In Mode Time (x10 s.)	Integer	The Walk-in mode allow at the TSI to comeback progressively on the AC priority source after an outage. Friendly use on Genset.

The top configuration window shows the following details:

- Parameter ID: 96
- Parameter Name: Source power ratio DC vs AC (%)
- Value: 0 to 100
- Description: Defines the priority source. Default value is "0"
0 - Feeding from AC IN has priority (Inverter AC/AC - EPC mode)
100 - Feeding from DC has priority (Inverter DC/AC - On Line mode)

The bottom configuration window shows the following details:

- Parameter ID: 106
- Parameter Name: Other;Walk In Mode Time (x10 s.)
- Value: Integer
- Description: The Walk-in mode allow at the TSI to comeback progressively on the AC priority source after an outage. Friendly use on Genset.

To additional DC output control in early Sierra...

- **Peak-shaving** (instantaneous)
- Phase **balancing** (serial)
- Basic battery **management**

The image displays three screenshots of the INVIEW software interface, showing configuration settings for a battery management system. The interface is titled "INVIEW Compas 5.2.0.3 Inside" and includes navigation tabs for Dashboard, Site, Reporting, and Administration. The user is logged in as "Basic (Basic)" on "2022/06/08 12:24:44".

The first screenshot shows the "AC Inputs" configuration table, with a red box highlighting the "Peak shaving" settings:

ID	NAME	VALUE
CF301	Override Power Limitation Timeout	20 s
CF1068	Default Power Limitation	-1 W

The second screenshot shows the "DC SYSTEM" configuration table, with a red box highlighting the "Phase balancing" settings:

CF1065	Tus sub sub system dc group	0
CF1069	P.AC max per phase safe mode	-1
CF1070	Phase compensation	1

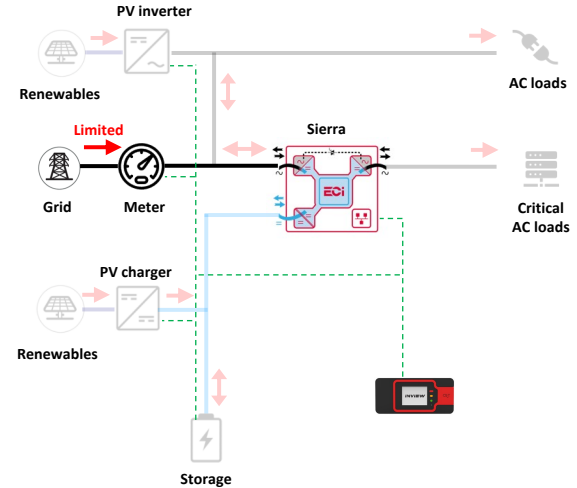
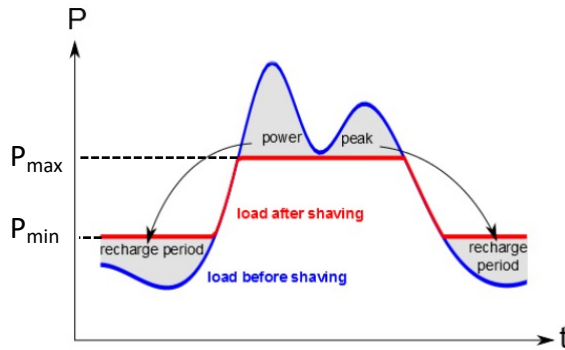
The third screenshot shows the "Battery Management" configuration table, with a red box highlighting the "Basic battery management" settings:

ID	NAME	VALUE
CF111	Voltage Per Cell	2.26 V
CF112	Source	Configuration
Current Limitation		
CF113	Enabled	False
CF114	Current Limit	5.00 A
CF115	Source	Configuration
Temperature		
CF121	Alarm Low Threshold	5.0 °C
CF122	Alarm High Threshold	50.0 °C
CF123	Alarm High Hysteresis	10.0 °C
CF126	Disable Charge When Too High	False
Temperature Compensation		
CF151	Enabled	False
CF152	Cell Coefficient	-2.50 mv/°C
CF153	Reference Temperature	25.0 °C
CF154	Minimum Temperature	15.00 °C
CF155	Maximum Temperature	40.00 °C
Boost		
CF201	Enabled	False
CF202	Voltage Per Cell	2.35 V
CF203	Timeout Enabled	False



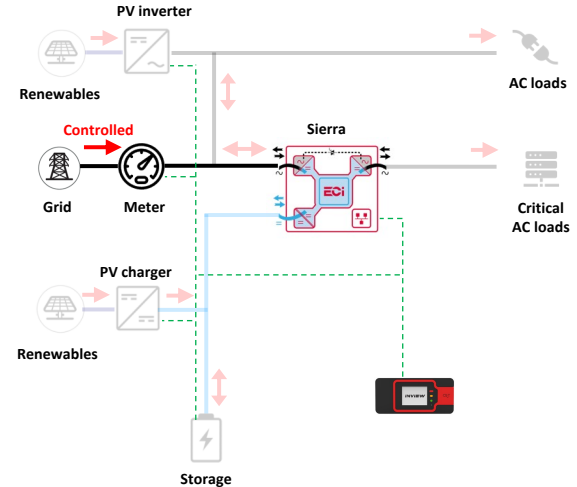
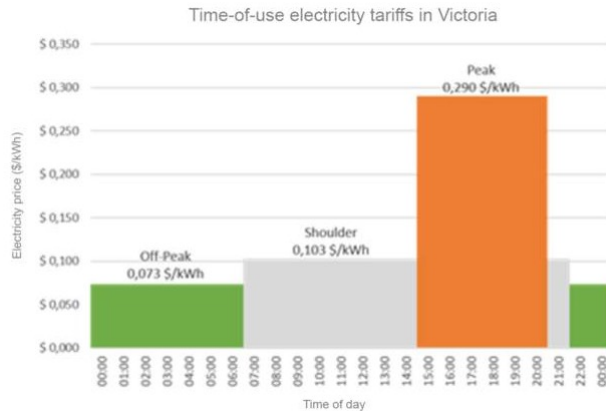
And fully bidirectional control of any converter!

- Average **peak-shaving**



And fully bidirectional control of any converter!

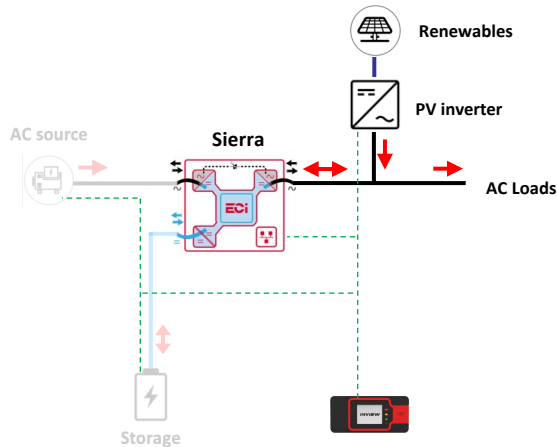
- **Energy arbitrage/Time-of-use**



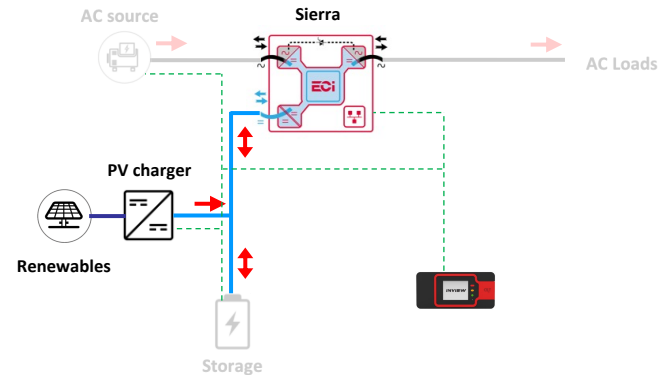
And fully bidirectional control of any converter!

See workshop1 tomorrow

- **AC coupling** renewable



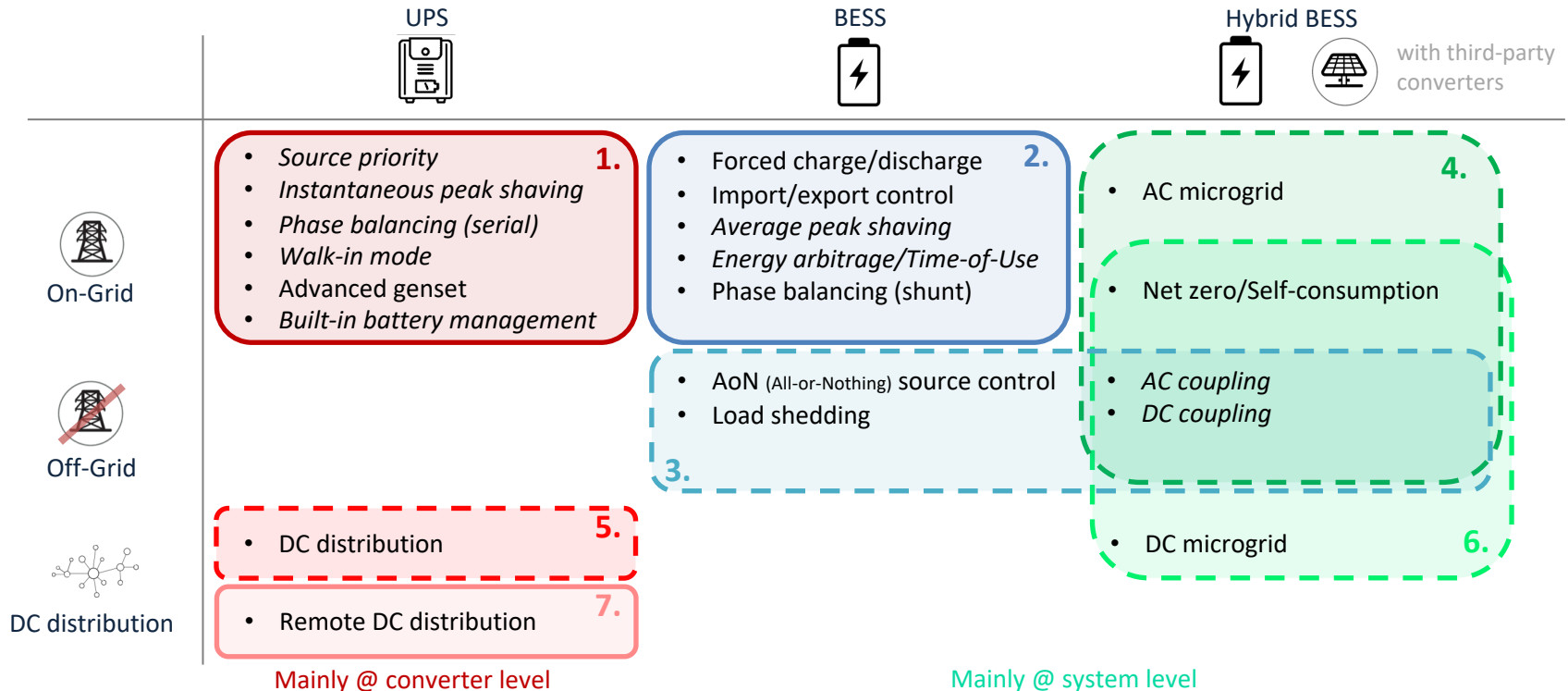
- **DC coupling** renewable



- With **advanced** battery management

PRODUCT OFFER




Capabilities packs



Packs licensing

Id	Name	Comment
1.	Smart UPS	Included in standard
2.	Battery Energy Storage System	
3.	Off-grid hybrid microgrid	
4.	AC hybrid microgrid	Includes 2
5.	Smart UPS with DC distribution	
6.	DC hybrid microgrid	Includes 2 & 5
7.	Remote DC distribution	
8.	Ancillary services ?	

Priorities & conflict

	 On-Grid	 Off-Grid
 Manual* mode	Forced charge/discharge OR Import/export control	<ul style="list-style-type: none"> • AoN source control • Load shedding
Auto mode	Average peak-shaving	
	Energy arbitrage/Time-of-Use	Net zero/Self-consumption
Tools	<ul style="list-style-type: none"> • (Advanced) battery management • AoN source control • Load shedding 	<ul style="list-style-type: none"> • AC coupling • DC coupling

* also includes API and other “external” control (from EMS for instance)

CONCLUSION

Power management offers optimized and resilient electricity usage

- Local control of more and more equipment
- Value captured via software licenses
- First 3 licenses progressively introduced in next 3 quarters
- Integrating customizations developed for early adopters into generally available capabilities

Thank you
for your attention

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