AUSTRALIAN ALLIANCE FOR ENERGY PRODUCTIVITY

Innovation Transforming Energy Productivity

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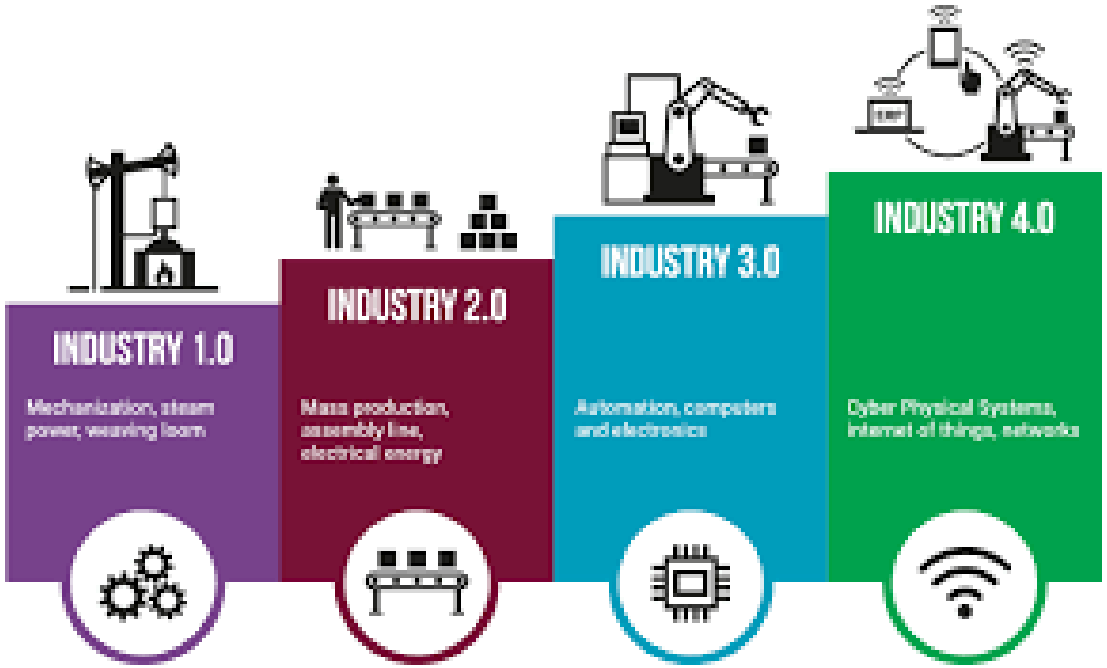
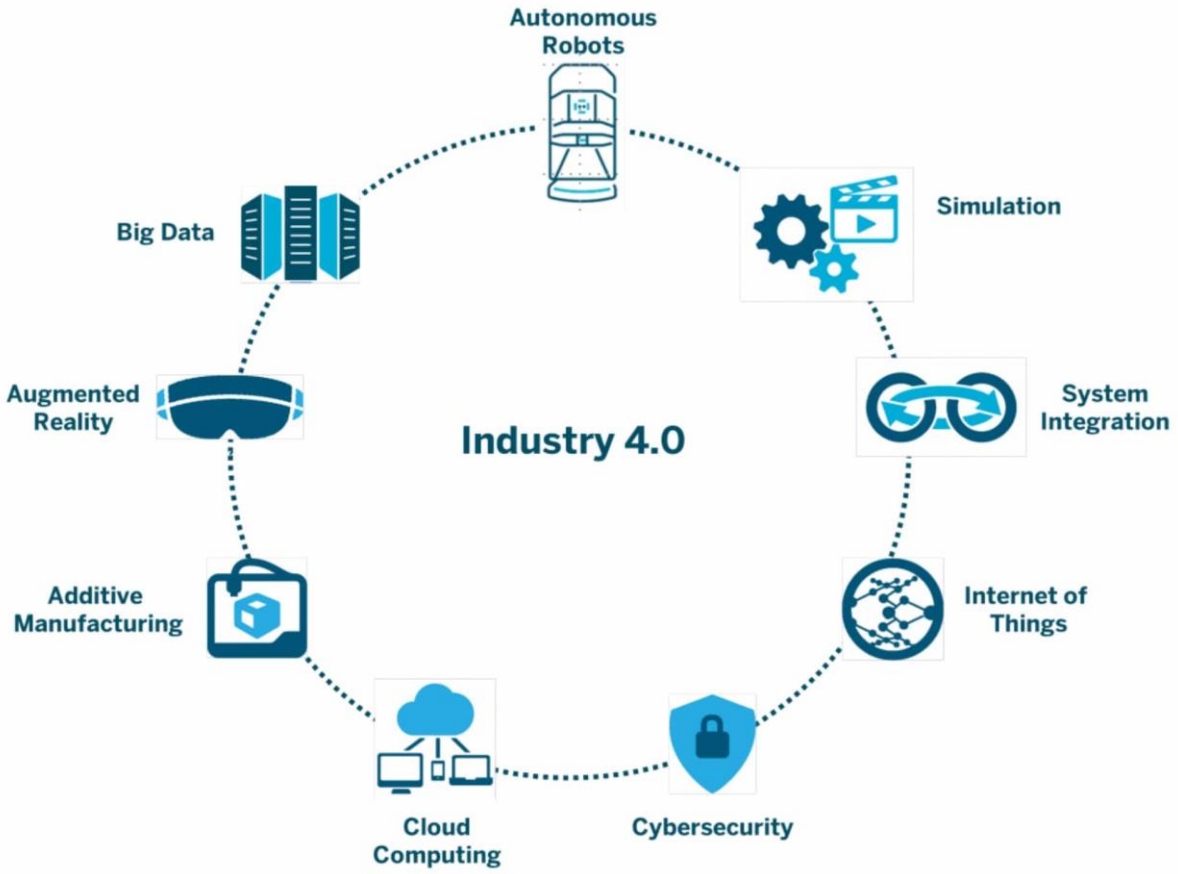
2xEP
Doubling Australia's Energy Productivity

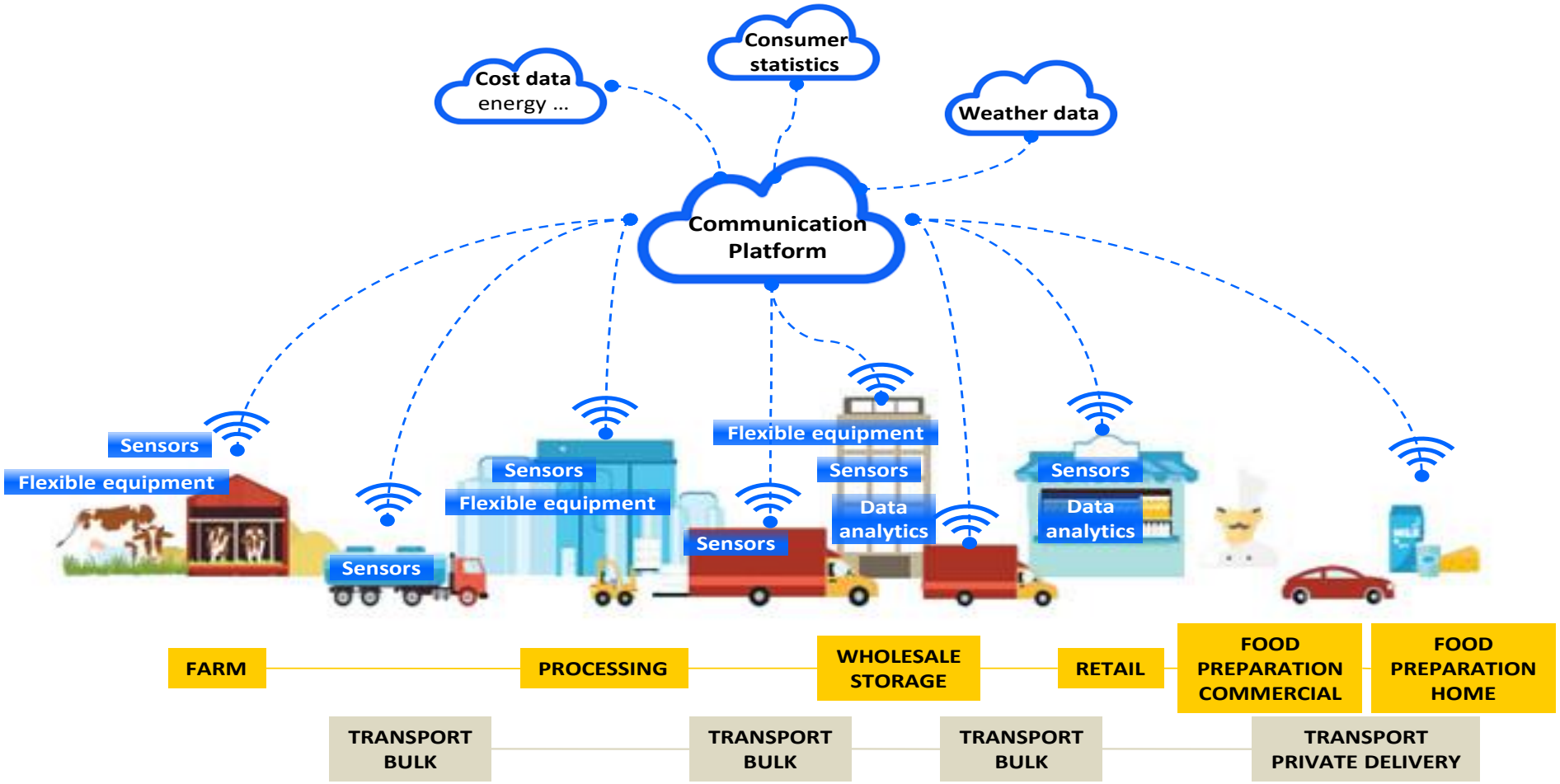
Industry 4.0 for Energy





Evaluating the ways that Industry 4.0 can transform energy productivity in manufacturing and value chains

The Power of Ubiquitous Data: Improve information flow across interfaces: between organisations and production lines



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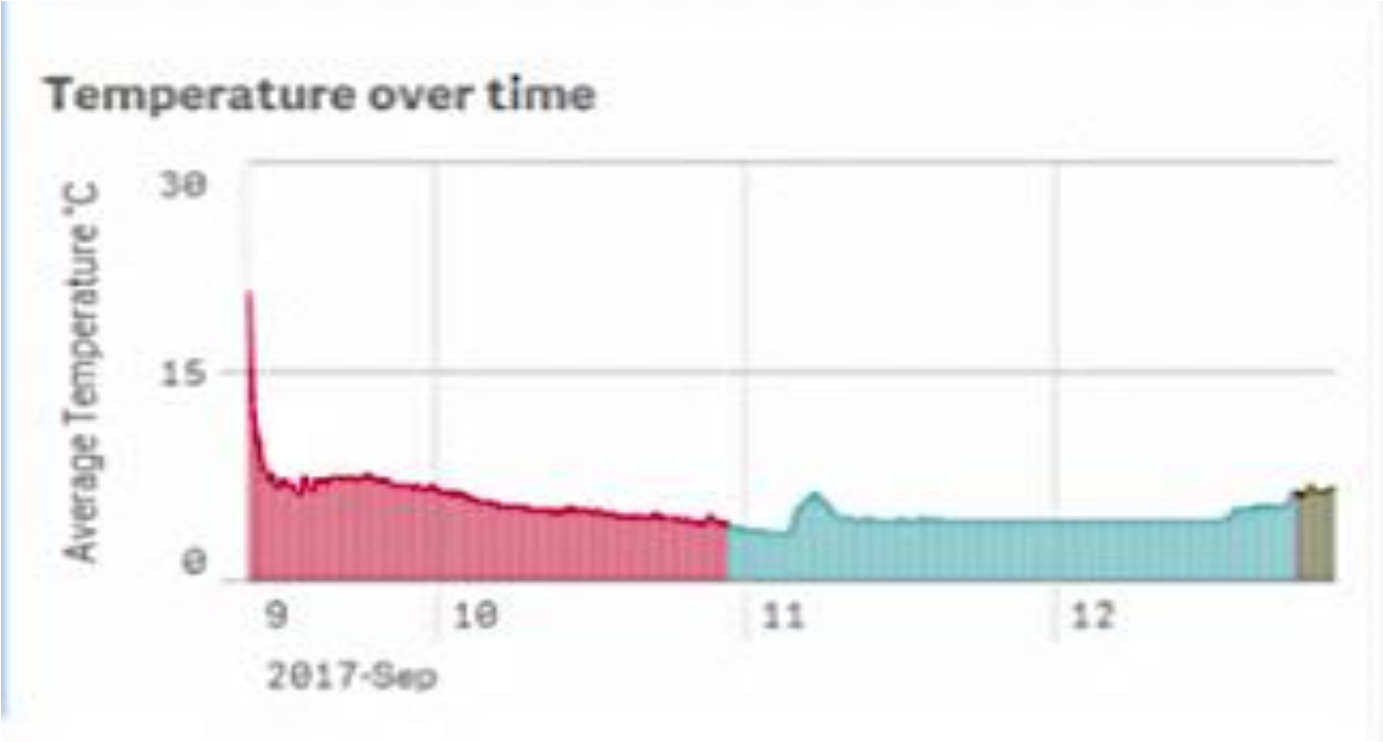

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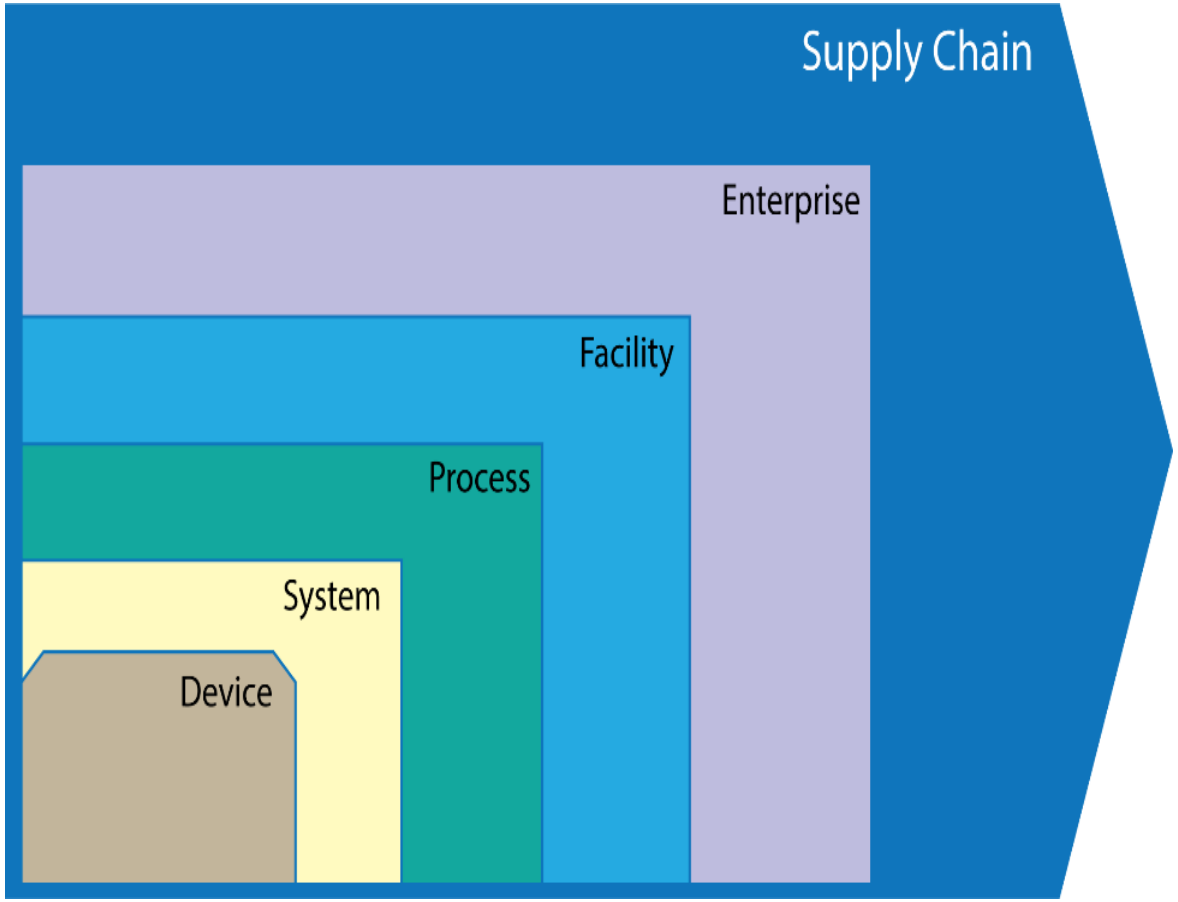


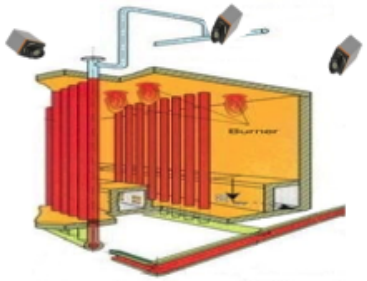
Source: ACEEE

Optimise energy intensive processes and systems

Furnace equipped with:

Distributed sensors
IR cameras

Distributed actuators
96 burners



•Develop initial new sensor
•reduce order model
•operator system

Use first unit data to calculate potential for all US sites

Evaluate and select sensor/model/actuator systems options

Rapid evaluation options
Maximise ROI

Demonstrate >5% waste heat reduction on a unit already 90% efficient

• 24/7 IR camera system engineered for harsh conditions

•Reduced order model (ROM) from big data analysis

Apply insights

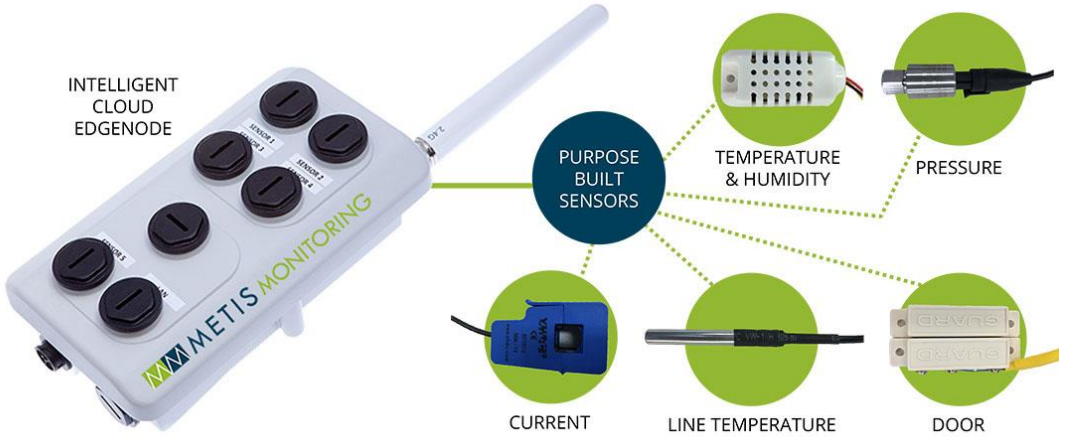
•Calculate 25 – 30% waste heat reduction for other 20 U.S sites

• High fidelity model in operation to predict ROM

• Reduce number of cameras to halve capital cost

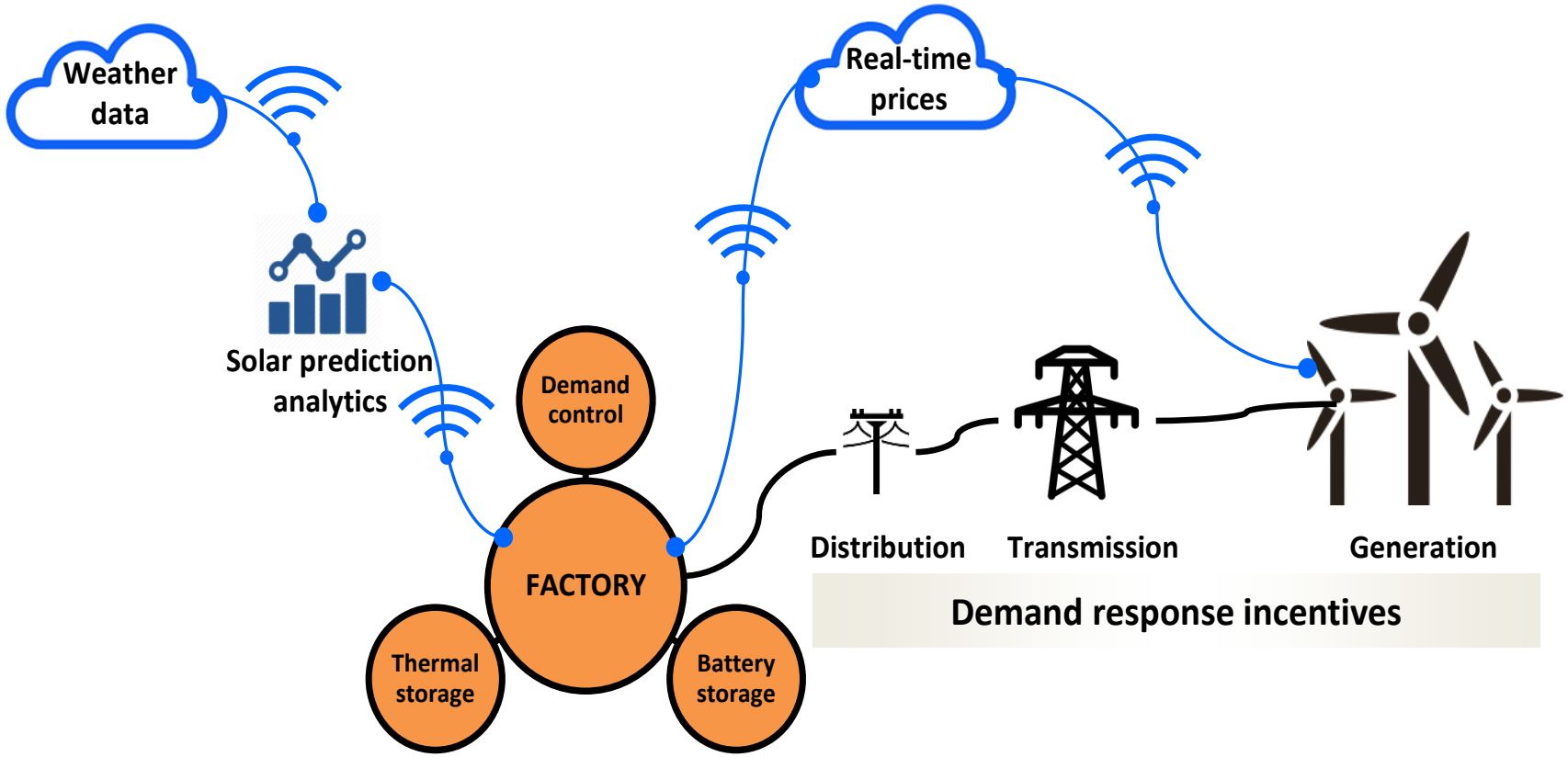
•Automate burner control

Praxair Smart Manufacturing Journey



Intelligent refrigeration monitoring

Energy Supply Chain Optimisation Using Industry 4.0



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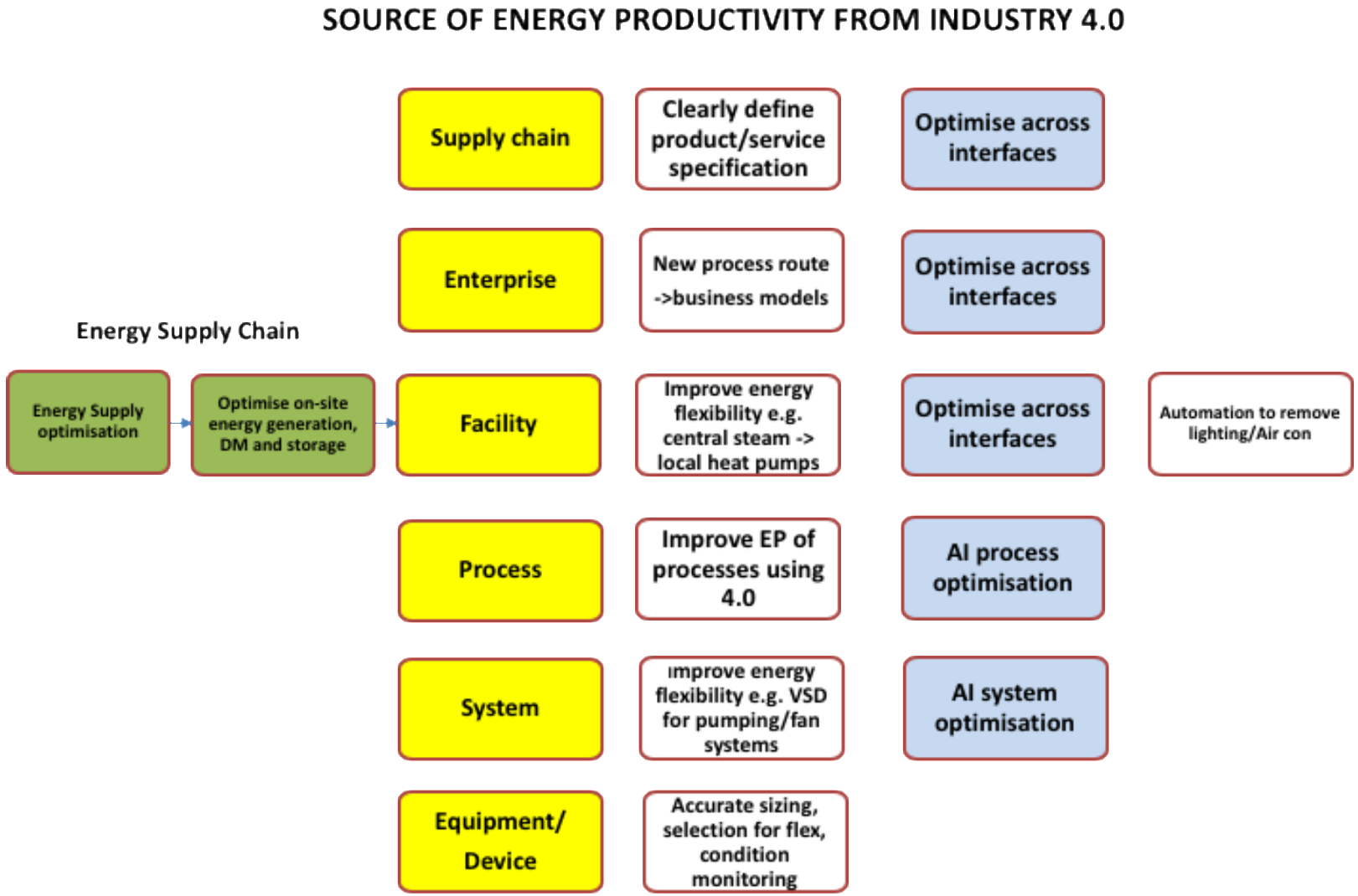
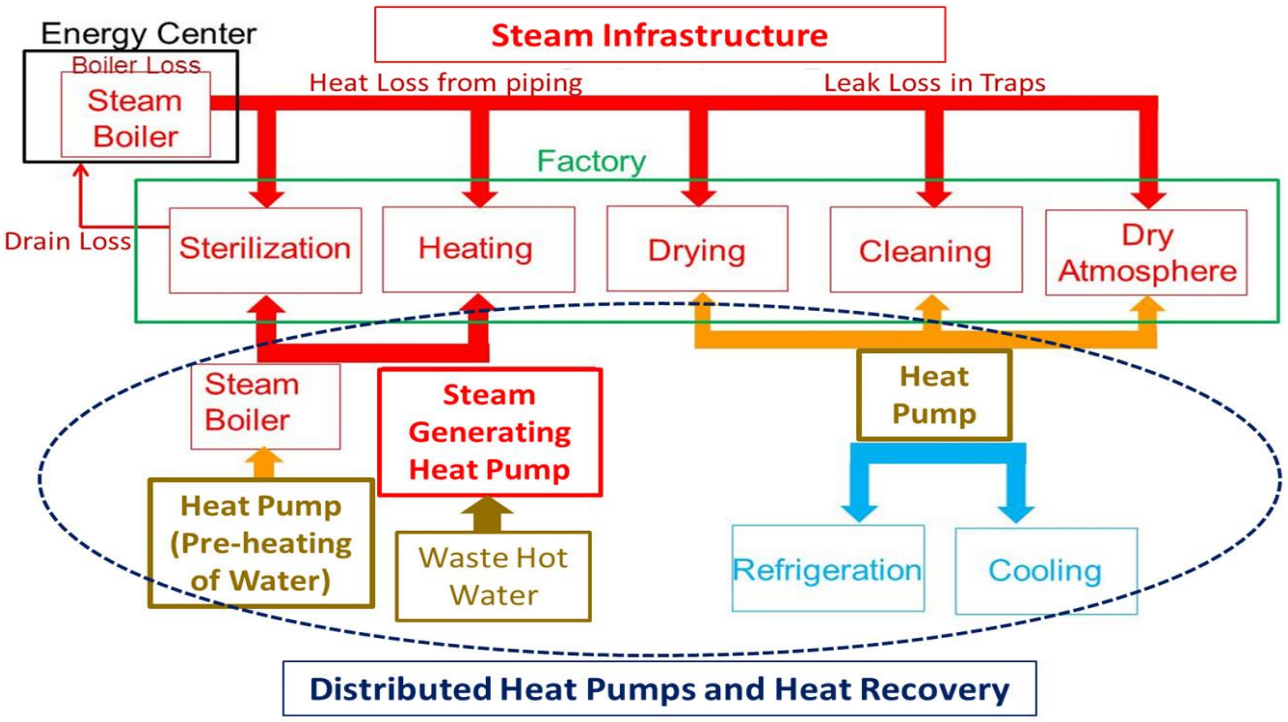


Energy Metering – our Achilles heel?

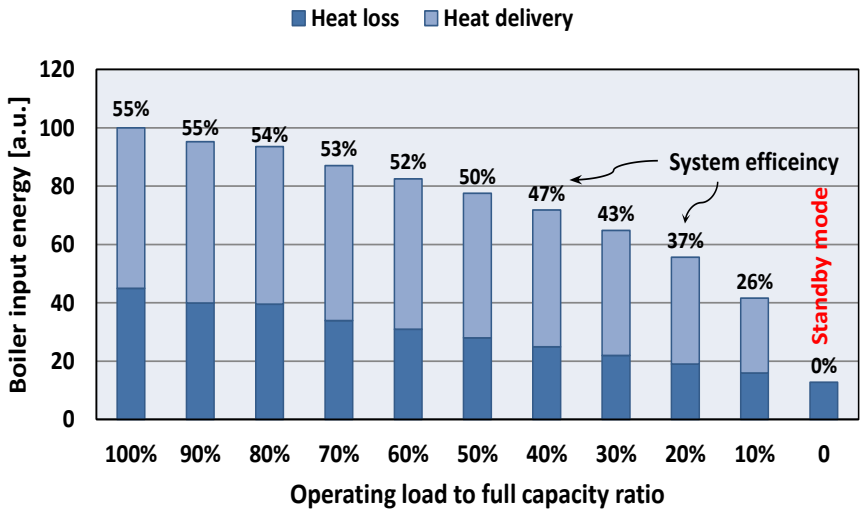
Industry 4.0 for Energy Findings

1. Industry 4.0 technologies/business approaches, and new electricity technologies (e.g. high temperature heat pumps) could double EP in manufacturing
2. BUT, Industry 4.0 will NOT AUTOMATICALLY drive substantial energy productivity gains.
3. Businesses must understand current energy use, and plan to specifically address EP
4. OR energy benefits will be limited by:
    - Lack of energy metering, monitoring and information tools.
    - Inflexibility and high standing energy losses of existing central energy distribution services e.g. steam and compressed air.
    - Lack of energy know-how

Replacing fossil fuel boilers with point of end use electro-technologies



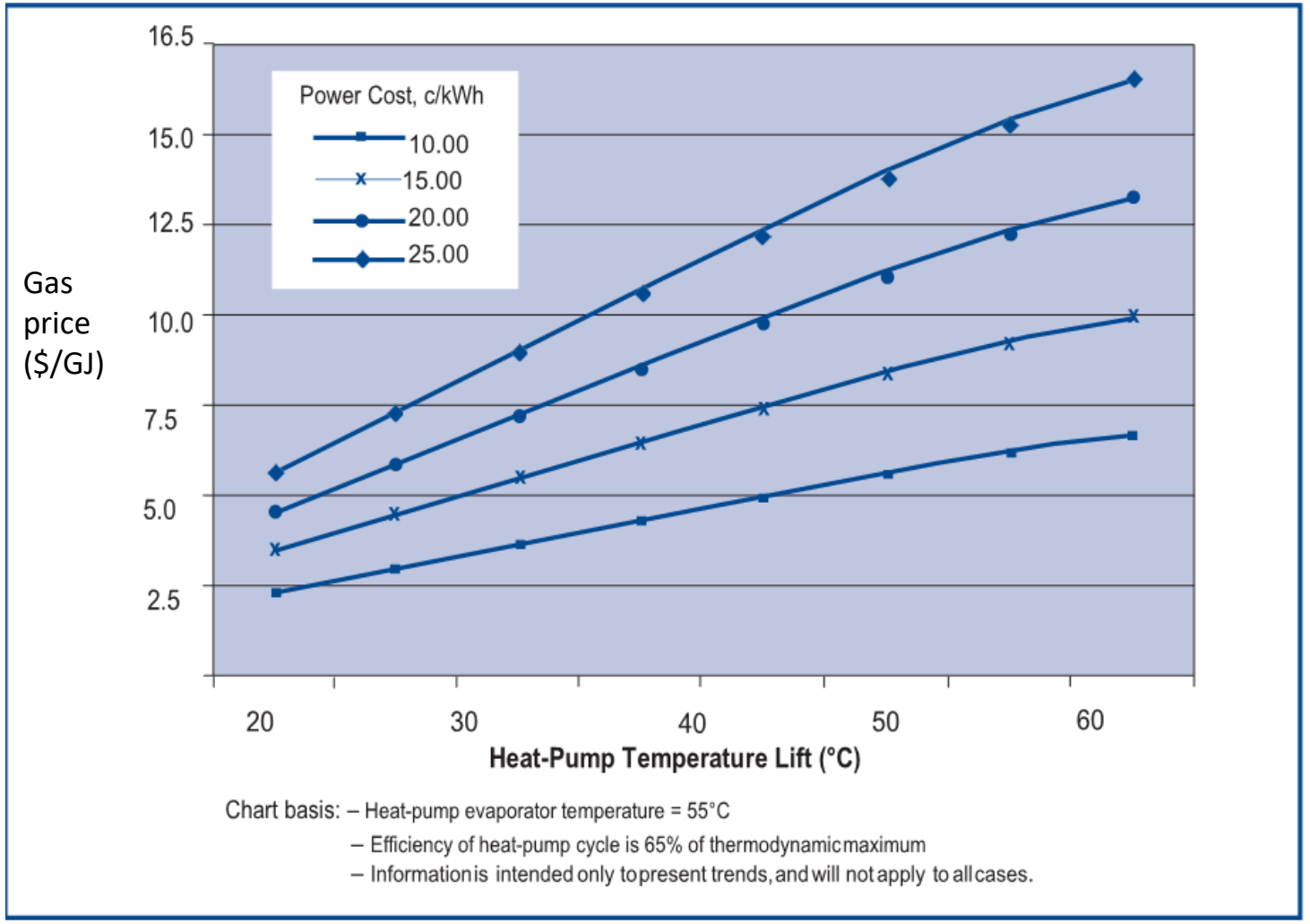
- Do you have steam system supplying mainly hot water?
- Is the boiler due for replacement?
- Do you have source of waste heat?
- Do you have major refrigeration plant?



Industrial heat pump applications

Application type	Features	Typical Industries
Dryers	Capture sensible and latent heat from exhaust streams	Milk, pasta, noodles…
Food washing	Capture sensible and latent heat (water vapour) from exhaust streams	Potatoes, vegetables, fruit
Water heating for process and cleaning	Capture waste heat from process or refrigeration (or air) compressors	All food
Pasteurisation	Can be heating and/or cooling role	Milk, juices, …..
Combined process heating and cooling	Ideal applications use the condensor for heating and evaporator for cooling simultaneously	An example is bread - product cooling and proving

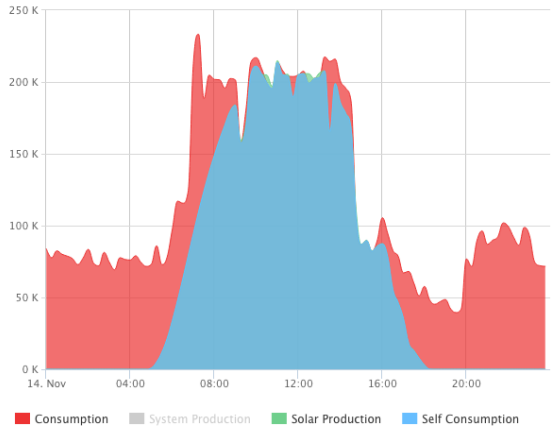
Heat Pump Economics



REALM =
Integrating Clean Energy

On-site generation

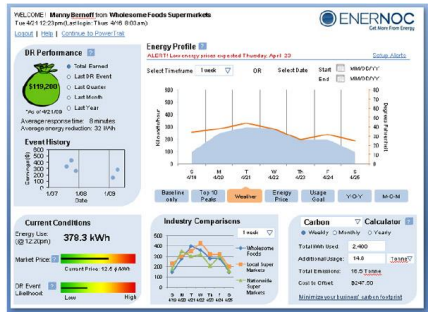
Storage for load management



Price signal(s) from retailers & networks

Energy Efficiency

Demand response



Most sites have significant load flexibility

Type	Process	Industry	Length of storage hrs	Cost
Storing heat	Melter process heat, hot water	Metals and minerals, H/W food, many other	Up to several	Low
Storing Cool	Cold water/ice in HVAC, cold storage	Commercial buildings, cold stores, food chain	Up to several	Low
Storing materials	Resource pre-processing, in-line storage	Paper, minerals, light manufacturing	Up to several	Low
Discretionary loads	Material transfers, staff amenities	Many – site specific	Peaks only	Low
Existing batteries	Existing storage for UPS	Mainly telco, data centres	Peaks only	Low
New batteries		Any		V high
On-site generation	Solar, standby, cogeneration and tri-generation	Any except cogen mainly food, chemicals, paper	Up to several	Varies
Targeted energy efficiency improvement	Building HVAC, cold storage, lights, motors etc	All	Peaks to continuous	Low to medium

What's next?

Pilot projects to demonstrate application of digitalisation/electrification/renewables to deliver more value from the energy applied.

- Steam replacement with electricity technologies – ARENA project
- Optimal integration of solar, DM, storage, to optimise usage vs price – REALM trials
- Companies implementing Industry 4.0 incorporating specific energy focus – I4.0 trials
- Feasibility of compressed air replacement
- Work with start-ups to pilot non-invasive AI 'metering', and low cost IOT energy data management

AHK Repräsentanz der Deutschen Wirtschaft German-New Zealand Chamber of Commerce Inc.

AHK Deutsch-Australische Industrie- und Handelskammer German-Australian Chamber of Industry and Commerce

energie waechter

MITTELSTAND GLOBAL ENERGY SOLUTIONS MADE IN GERMANY

New Zealand-Germany Business Conference 2018:

Trans Technological Energy Solutions for the Industrial Sector in New Zealand

Monday, 15th October 2018, 9:00 am – 5:00 pm

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