Narrative map

1. 1. Establish the global transition and the system-level thesis.
2. 2. Define why commercial kitchens are difficult to electrify.
3. 3. Convert those difficulties into three design requirements.
4. 4. Show why direct induction heating answers the first requirement.
5. 5. Prove scale across cooking, dishwashing and ventilation.
6. 6. Expand from individual equipment to a complete electric-kitchen platform.
7. 7. Explain the four directions in which the platform is evolving.
8. 8. Reduce ventilation loads before discussing heat recovery.
9. 9. Select heat-recovery opportunities using project-specific evidence.
10. 10. Use a chain-kitchen retrofit to show the implementation sequence.
11. 11. Connect equipment data, energy, alerts and process standards.
12. 12. Connect the kitchen to the wider building energy system.
13. 13. Close by resolving the original challenge.

ZERO CARBON RETREAT

Commercial Kitchen Electrification in China

High-power induction, energy integration, and smarter operations

Iris Zhang · Ucook Induction

Real projects. Practical lessons. A building-scale opportunity.

THE CHALLENGE

The kitchen is often the hardest load to electrify

01 **HIGH PEAK LOAD**

Large cooking capacity and fast recovery

02 **LONG DUTY CYCLES**

Continuous operation through service periods

03 **VENTILATION + HVAC**

Cooking, exhaust and makeup air are tightly linked

Electrification succeeds when cooking, electrical capacity and ventilation are designed together.

THE DESIGN RESPONSE

The solution must change both cooking and the building load

CHEF PERFORMANCE fast response + precise control	→	**INDUCTION COOKING** — direct electromagnetic heating
CLEAN HEAT no onsite combustion at the appliance	→	**ALL-ELECTRIC LINE** — wok, boiling, steaming and washing
LOWER ROOM LOAD less ambient heat to remove	→	**SYSTEM INTEGRATION** — ventilation, heat recovery and controls

Induction is the anchor — but a zero-carbon kitchen is the complete system around it.

COMPARE LIKE WITH LIKE

Efficiency numbers require a test method and a boundary

THE COMMON METHOD

ASTM F1521-22

20 lb water
70°F → 200°F
full-input boil test

Cooking efficiency = energy absorbed by the water ÷ appliance energy input

COMMERCIAL INDUCTION

≥80%

ENERGY STAR qualification threshold

82.0%–90.4%

Frontier Energy sample:
8 commercial induction hobs,
1.4–5.0 kW

GAS: USE CAUTION

25%–40%

Frontier Energy open-burner results under the same water-boil method

Not a universal ceiling for modern gas equipment. Burner design, vessel and test conditions matter.

Do not mix cooking efficiency with combustion efficiency, inverter efficiency, or whole-kitchen energy use.

REAL-WORLD DEPLOYMENT

At scale means the whole kitchen — not only the cookline

Cooking · steam · dishwashing · ventilation · makeup air · water and energy flows

Electrifying Traditional Cooking at Any Scale

SMALL WOK · Ø300–400 MM

Individual cooking and open kitchen applications

MEDIUM WOK · Ø450–600 MM

Restaurant and commercial cooking applications

LARGE WOK · Ø700–900 MM+

High-volume restaurants and central kitchens

ALL COOKING SCALES CAN BE ELECTRIFIED

traditional wok cooking · high-volume kitchens

From traditional wok cooking to large-scale commercial kitchens, induction technology enables different cooking scales to become fully electric.

ONE HEATING PRINCIPLE, MANY APPLICATIONS

Electrification is a kitchen system — not a single appliance

WOK + GRIDDLE

high-response cooking

STOCK POT + NOODLE

high-volume boiling

STEAM + COMBI

batch and precision cooking

TILTING + MIXING

automated production

Design from the menu and duty cycle backward.

THE PLATFORM IS NOW EVOLVING IN FOUR DIRECTIONS

The next generation is more powerful, complete and measurable

01

HIGH-POWER INTEGRATION

5–30 kW in our portfolio
multi-zone cooking suites

02

FULL-KITCHEN COVERAGE

wok, steam, boiling,
automation and washing

03

DIGITAL LOW-CARBON CONTROL

energy monitoring,
alerts and remote support

04

ENGINEERING ITERATION

cooling, materials,
durability and global voltage

Technology progress matters only when it improves the performance of the complete kitchen.

Reduce the load first. Recover heat second.

1

DIRECT HEATING

Reduce heat released to the room

2

RIGHT-SIZE AIRFLOW

Capture and contain with less total airflow

3

DEMAND CONTROL

Match fan speed to cooking activity

4

TARGETED RECOVERY

Recover only where the stream and economics fit

The cheapest recovered kilowatt is often the one we avoid exhausting.

Choose the cleanest, most useful heat stream

SOURCE	POTENTIAL USE	DESIGN GATE
KITCHEN EXHAUST	Preheat makeup air or water	Grease fouling, fire safety and cleaning
DISHWASHER / HOT WATER	Recover sensible heat for water preheat	Temperature profile and hygiene separation
WASTEWATER	Heat-pump or heat-exchanger recovery	Screening, fouling and maintenance access

ASHRAE caution: grease-laden exhaust can foul heat exchangers; regular cleaning and fire-safe design are essential.

CASE STUDY · NOODLE RESTAURANT CHAIN

A chain-kitchen retrofit starts with the operating problem

PHASE 1

Protect food quality

Track cooking temperature, holding, refrigeration, washing and soup preparation.

PHASE 2

Control energy

Add submetering and staged controls for lighting, HVAC, exhaust, makeup air and sanitation.

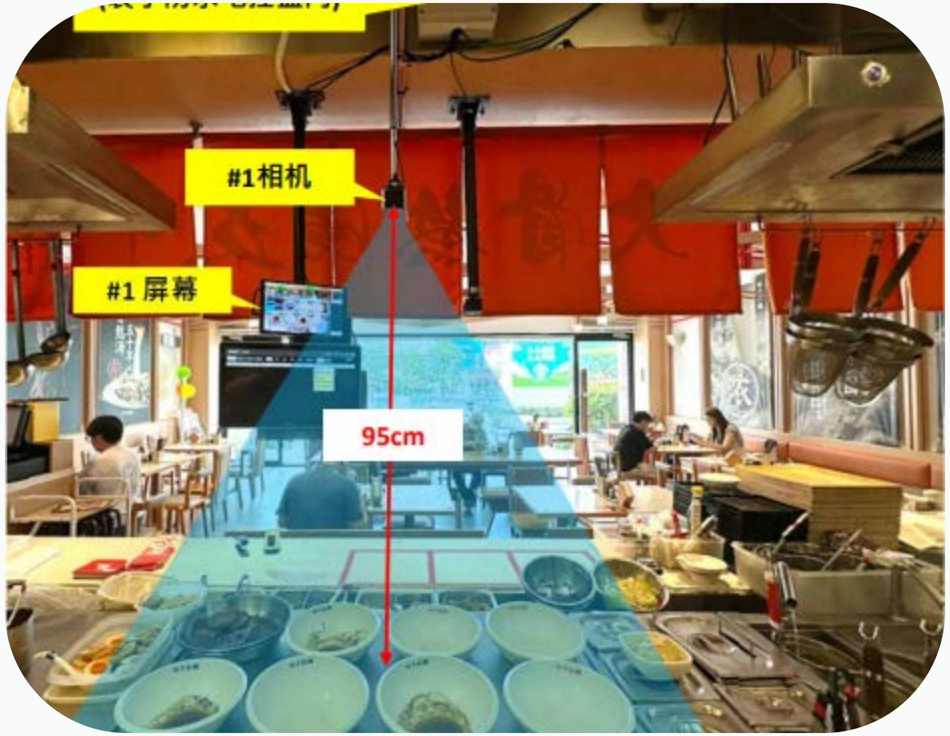
PHASE 3

Build the management loop

Connect equipment data with reports, alerts and selected quality-control analytics.

Pilot one representative store first; verify the data loop before scaling.

The case links devices, energy, alerts and process standards



MONITOR

temperature · status · energy

STANDARDIZE

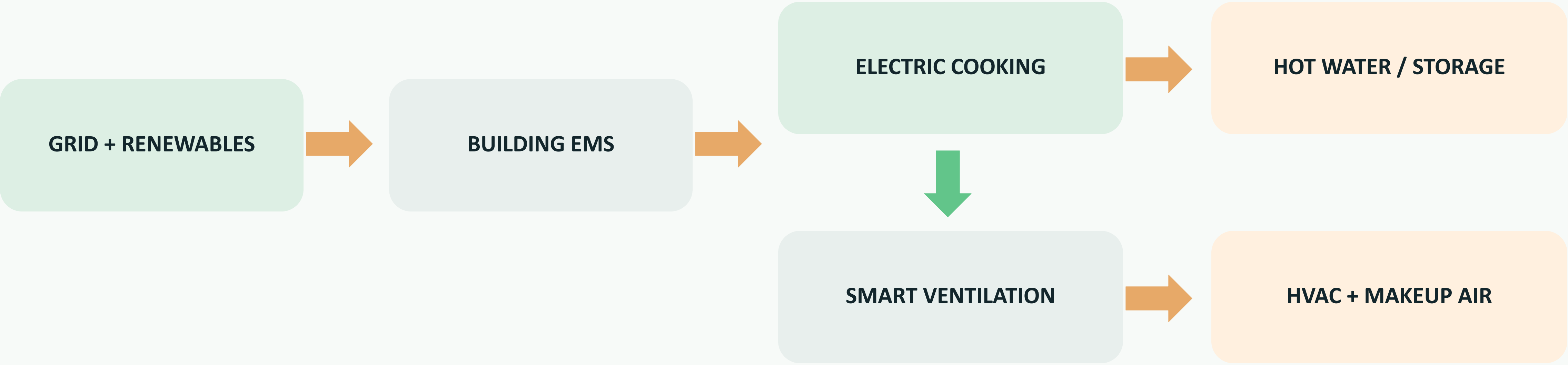
recipes · timing · operating rules

RESPOND

alerts · diagnostics · maintenance

Design rule: local safety and manual control remain available; cloud functions support—not replace—safe operation.

Connect cooking, ventilation and recovered heat



Design target: lower peaks, lower airflow, measurable energy — and recover heat only where it has a useful destination.

THE TAKEAWAY

The future kitchen is electric — and integrated.

1 Induction anchors clean electric cooking
2 Scale includes washing + ventilation
3 Pilot, measure, control — then replicate

Questions & Discussion