

# **INDECK**

KEYSTONE ENERGY, LLC.



## ***I-HRSG***

Indeck Heat Recovery Steam Generators

***Heat Recovery Steam Generators  
Waste Heat Recovery Boilers***

# INDECK's Industry Leading Multiple Pressure Reheat Design

## Large Utility Combine Cycle Power Plants

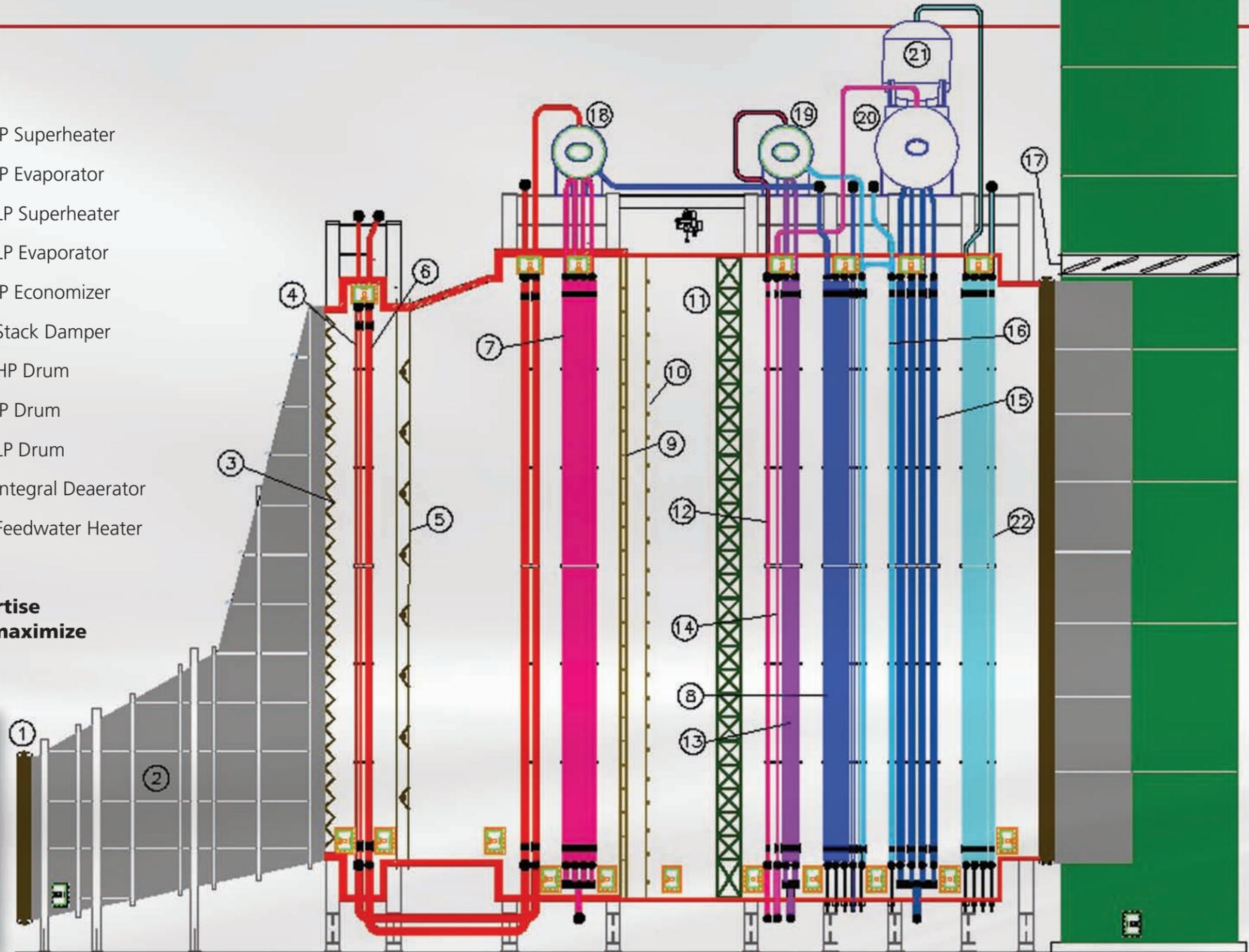
### I-HRSG The solution for efficient reliable steam generation...

The combined cycle plant is a popular choice to meet the world's power generation needs. The use of Indeck's Steam Generators to recover heat from gas turbine exhaust is vital for maximum performance, higher efficiency, and greater cost effectiveness.

For the past 175 years, industry and utilities have turned to Indeck for efficient steam solutions.

- |                            |                        |
|----------------------------|------------------------|
| 1. CT Expansion Joint      | 12. IP Superheater     |
| 2. Flue Gas Inlet Duct     | 13. IP Evaporator      |
| 3. Distribution Grid       | 14. LP Superheater     |
| 4. HP Superheater          | 15. LP Evaporator      |
| 5. Duct Burner             | 16. IP Economizer      |
| 6. Reheater                | 17. Stack Damper       |
| 7. HP Evaporator           | 18. HP Drum            |
| 8. HP Economizer           | 19. IP Drum            |
| 9. CO Catalyst             | 20. LP Drum            |
| 10. Ammonia Injection Grid | 21. Integral Deaerator |
| 11. SCR Catalyst           | 22. Feedwater Heater   |

**Indeck's HRSG engineering expertise will provide design features to maximize availability.**



# INDECK

## I-HRSG Optimized Design for Modern Plant Requirements



### Cycling Design and Rapid Startup Features . . .

- Oversized drains to quickly remove condensate from Superheaters and Reheaters
- Quick acting desuperheater spray water isolation valves
- Extensive use of alloys to minimize thermal stresses
- Seamless superheater tubes
- Available full penetration welds in critical locations
- No shared economizer headers between pressure levels
- Thermal shock resistant economizer inlet harps
- Fully vented and drainable economizers
- FAC (Flow Assisted Corrosion) mitigation with alloy materials
- Extended mobility stainless steel bellows on lower casing piping penetrations
- Transient rated primary steam separation technology
- Sparging systems for hot standby
- Insulated stack dampers with rain gutter



### I-HRSG Designed for Superior Performance and Advanced Operations

- Modularized components for reduced field man-hours
- Proven design for turbine discharge ducts
- Full fillet welded liner support stud system
- Experienced CFD exhaust gas path modeling
- Heating surface baffle system prevents flue gas bypassing
- Multi-point natural circulation system modeling



### I-HRSG Maintenance and Inspection Features

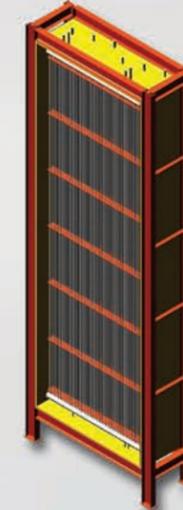
- Rooftop access doors
- Bore scope ports in steam headers and piping
- Sky climber anchor ports in access lanes
- Limited tube bank depths

# INDECK

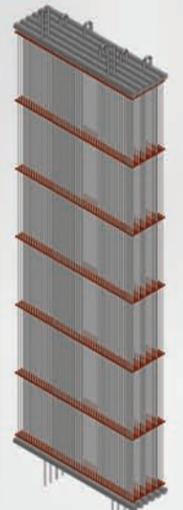
## I-HRSG Module Construction For Flexible Installation Options to Minimize Field Labor and Overall Project Cost



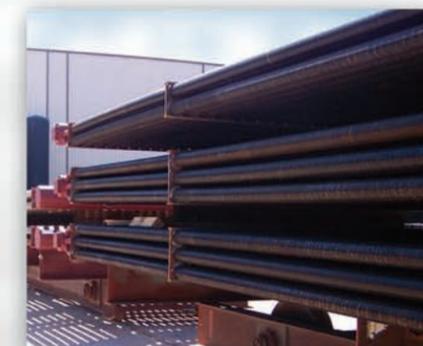
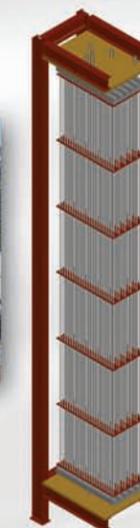
**Modular Box**  
Complete Module



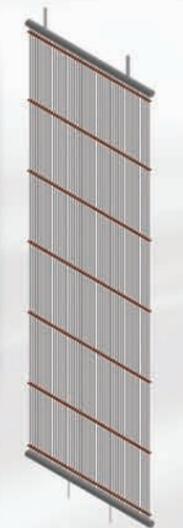
**Field Modular**  
Pressure Part Module



**C Section**  
Partial Module

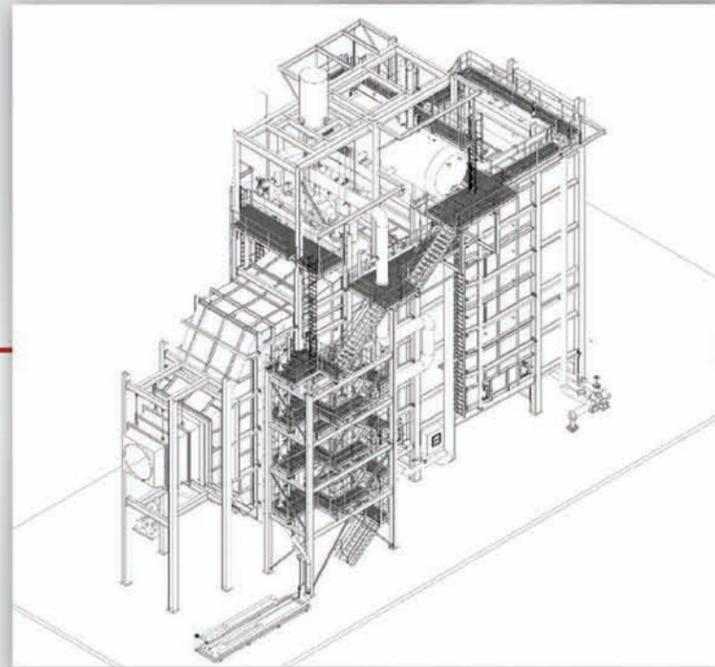


**Platen**  
Sub-Assembly

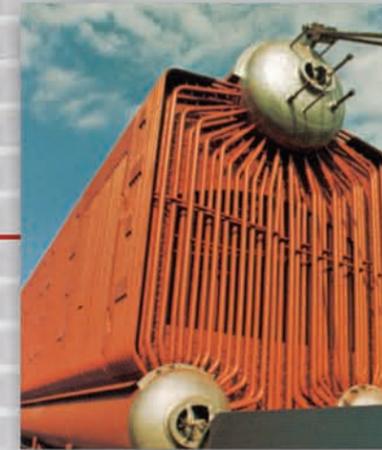


# INDECK Waste Heat Recovery Boilers

Indeck is uniquely qualified as a designer and producer of steam generating systems for 175 years. Indeck has gained considerable experience in the design and manufacturing of a broad range of waste heat recovery boilers.



**Large Process Waste Heat Recovery Boiler**



**Three Drum Open Bottom High Particulate Waste Heat Module**



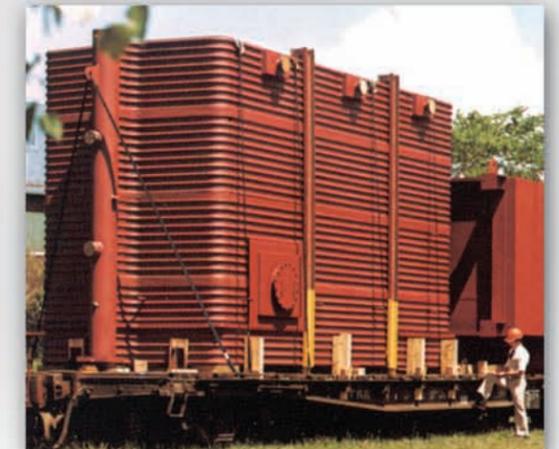
**Fluid Catalytic Cracker Waste Heat Module**



**Fluid Catalytic Cracker (FCC) Waste Heat Recovery Modules**



**Incline HRSG Behind Small CT**



**Membrane Waterwall Furnace for High Firing**



**Modular Box Shop Assembly**



**Field Modular Shipment**



**Packaged Waste Heat Boiler**

Indeck extended surface and bare tube surface designs for other non-gas turbine waste heat applications are ideal for clean to dust laden/dirty gas streams. Fin density and tube/fin material varies with exhaust gas temperature, particulate loading and corrosion potential.

# INDECK

## I-HRSG Aftermarket Engineering, Parts and Service

- Indeck's industry leading engineering and service can improve your HRSG performance and reliability.
- Indeck is able to redesign and supply new heat recovery modules and tubes for all HRSG OEM designs.
- Indeck has the capability to understand and solve the challenges faced by combined-cycle plant operators throughout the world.



**HRSG fully assembled modular box replacement**

### Comprehensive Repair and Upgrade Capability for:

- Heat Recovery Steam Generators
- 2-Drum Boilers
- Keystone Package Steam Generators
- VL Boilers
- Travagrate Stokers/Solid Fuels
- Experts in Boiler Start-up, Repair and Upgrades
- Economizers, Airheaters and Preheaters
- Superheater and Economizer Elements
- Steam Drum Internals and Steam Purifiers
- Burners, Fuel Feeders and Boiler Tubes
- Highly Knowledgeable Field Service
- Consultants and Construction Supervisors
- Unit Inspections
- Custom Training Programs, Outage Planning, Project Management
- Condition Assessments
- Maintenance Support
- On-Site Testing and Re-Commissioning
- Construction and Installation Services



Because of such broad experience, comprehensive expertise and specialized resources, Indeck is uniquely qualified to provide any or all components for your boiler or HRSGs.

### Indeck's heritage of 175 years include many leading industry boiler brands. Indeck is the Exclusive Supplier of O.E.M. Boiler Parts and Services for:

- Erie City Iron Works
- Zurn Energy Division
- Aalborg Industries, Inc. (Industrial Land Based Boilers)
- Indeck Boiler
- Volcano
- International LaMont
- Starfire
- International Boiler Works
- Thermoflo



# INDECK Group of Companies

The Indeck Group of Companies designs and manufactures a complete line of industrial boiler systems including package boilers, HRSGs, waste heat boilers, dirty gas boilers, solid fuel boilers and hot water generators. Indeck has supplied over 5,000 package boilers, HRSGs and solid fuel boilers in over 45 countries. Typical waste gas sources include: gas turbines, process gas, kilns, chemical process, refinery process, etc. Large capacity designs of up to 1,000,000 pounds per hour of steam are available.

**Indeck Power Equipment Company** has the largest inventory of boilers for sale, lease, or rental in North America. Stock sizes range to over 250,000 pounds per hour of steam. A huge selection of boiler components is always available for immediate shipment.



**Indeck Keystone Energy** has over 175 years of steam generating experience, a history dating back to the 1840's as Erie City Iron Works, Zurn Energy Division, and Aalborg Industries. Indeck Keystone Energy has engineering, graphics and project management skills which are recognized as leaders in our industry.

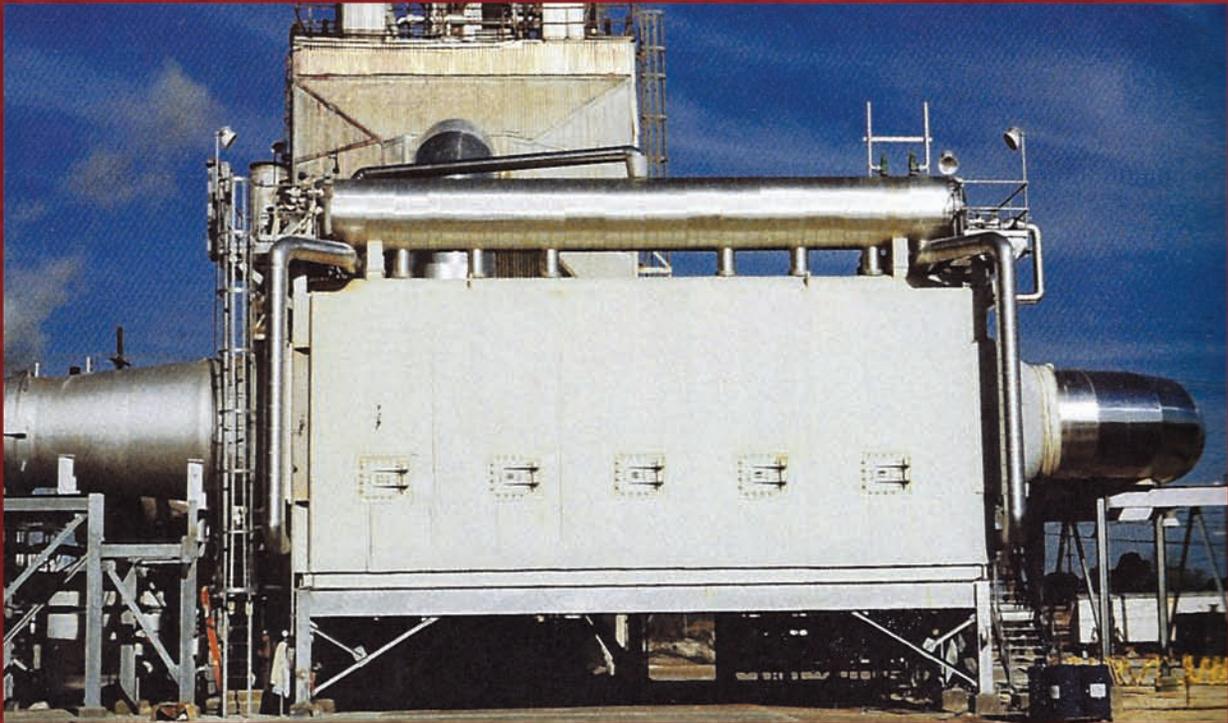
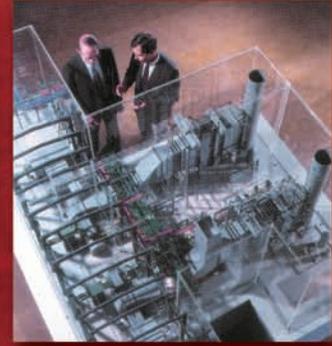


**Indeck Boiler Corporation** has been manufacturing boilers for over 90 years. Indeck Boiler Corporation has history dating back to the 1920's as Volcano. Indeck also has the International Boiler Works designs through our Volcano acquisition. Indeck Boiler Corporation has long been known as a source of high-quality manufacturing of boilers.

**Indeck Energy** is a privately held developer, owner and operator of power generation projects. For more than 25 years, Indeck Energy has demonstrated the imagination, know-how and determination it takes to succeed in this ever-changing industry. We're dedicated to providing communities with reliable power using environmentally sound approaches.



The Indeck Group of Companies is the home to many of the most trusted boiler designs ever built. You can find the top industry trade names of Volcano, Erie City Iron Works, Zurn, Aalborg Land Based Boilers, and International Boiler Works all under one roof. Manufactured styles include HRSGs, packaged waste heat boilers, Package Boilers (A, O, D, Modular), Lamont High Temperature Hot Water, Solid Fuel. Indeck has the experience to provide a high-quality steam generation system in a timely manner.



## The Indeck Group of Companies

### **Indeck Keystone Energy LLC**

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Support Line  
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