

Neil Eccles June 2013

SBED TSC Technology



The drivers



- Buildings account for 40% of energy use and CO₂ emissions.
- In Northern Europe one half of the above is used for space heating/cooling.
- Reduction in demand for space heating and substitution of remaining demand by renewable source is required to meet 15% CO₂ reduction target for 2020.
 - 2011 estimate 3.8% up from 3.2% in 2010
- Future proofing of the business.
- Compliance with building regulations and BREEAM.
- Economic return on investment and fuel inflation / security.



Transforming the role of building envelope / fabric
from **passive** fuel and
energy conservation to **active** generation of
renewable energy, storage,
distribution, control and management.



Micro-generation on a macro scale



Technology Pipeline



TRL 1-3
Fundamental
research

TRL 3-6
Technology
development
and scale up

TRL 6-8
Component
and system
development

TRL 8-9
Commercial
implementation

University
Research
Portfolio

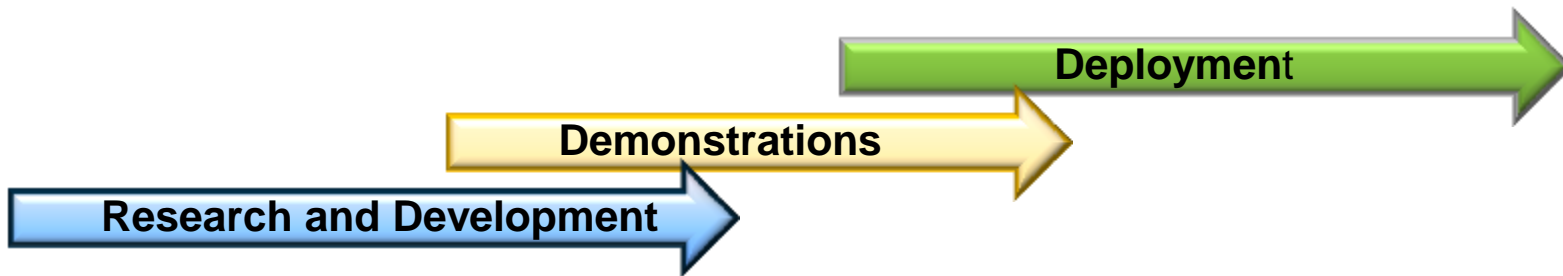
Postgraduate
Training
Portfolio

SPECIFIC

SBEC
Sustainable Building
Envelope Centre

Tata
Manufacturing

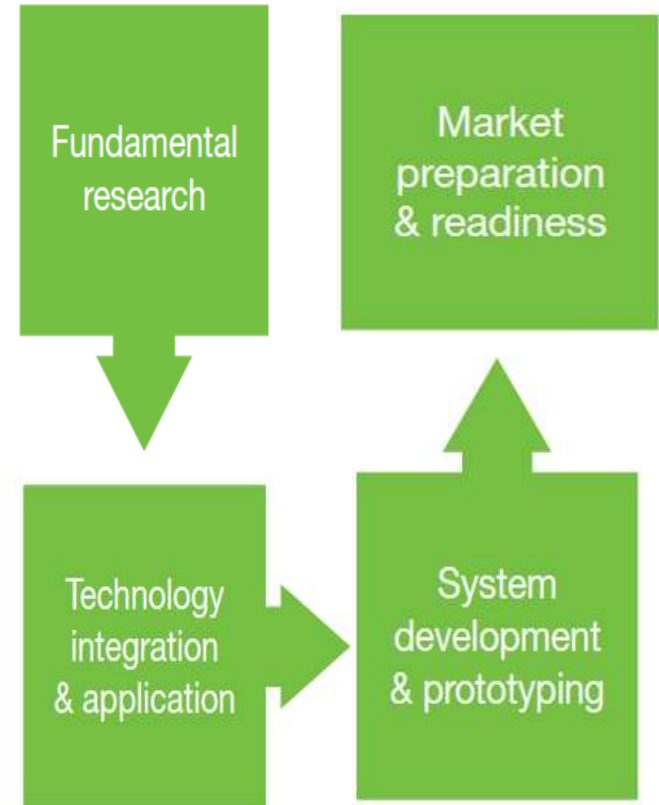
Global Market



SBEC Output



- Theoretical modelling / simulation
- Experimentation
- Pilot projects
- Develop design methodologies and software tools
- Produce design, manufacturing and installation specs.
- Commercial articulation.
- Identify and collaborate with supply chain.
- Obtain product approvals and accreditation.
- Lobby for technology recognition, qualifications for incentives and subsidies.
- Develop proto norms / standards for the products for eventual adoption by industry.



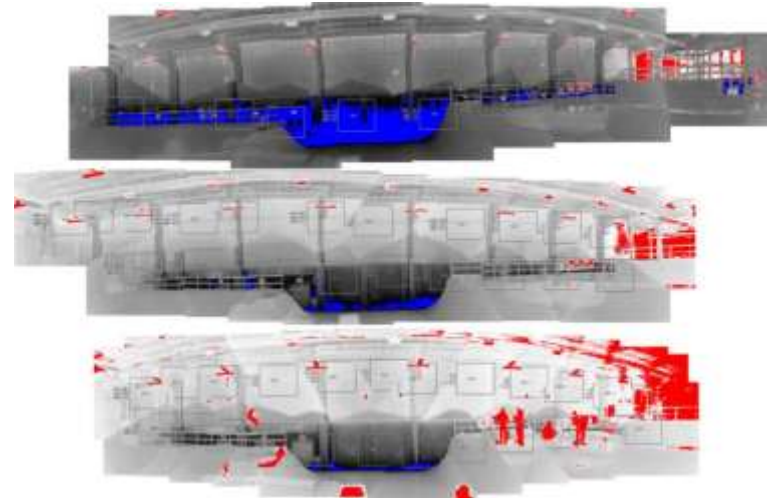
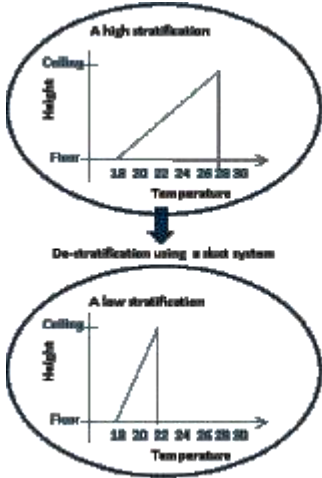
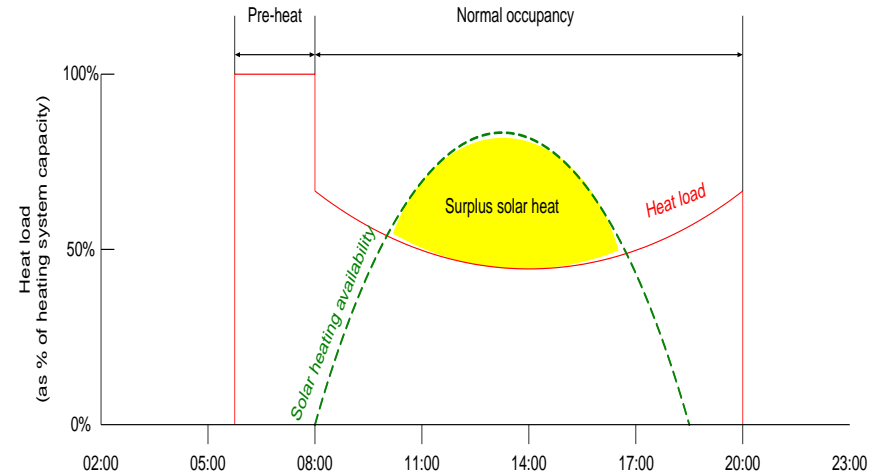
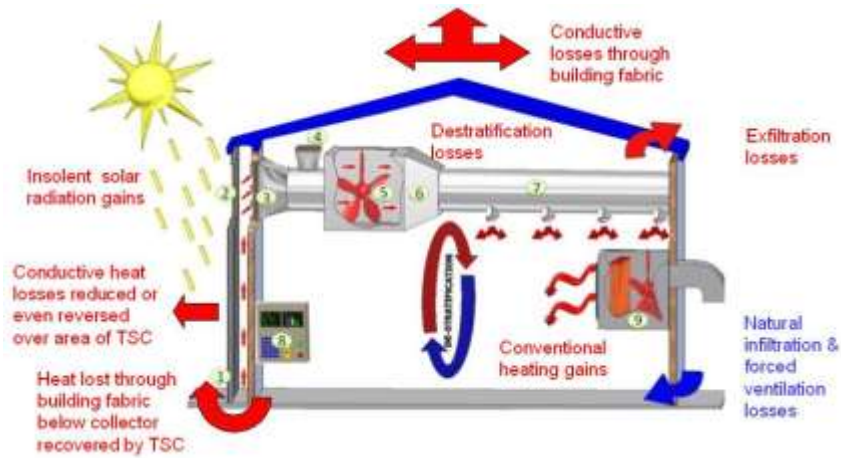


To design, model, test, prototype and monitor low carbon building systems incorporating Transpired Solar Collectors (TSC) in eight 'buildings in use' in Convergence Areas of Wales.

**“*Creativity* is thinking up new things.
Innovation is doing new things.”**

Theodore Levitt

Transpired Solar Collector Base Technology

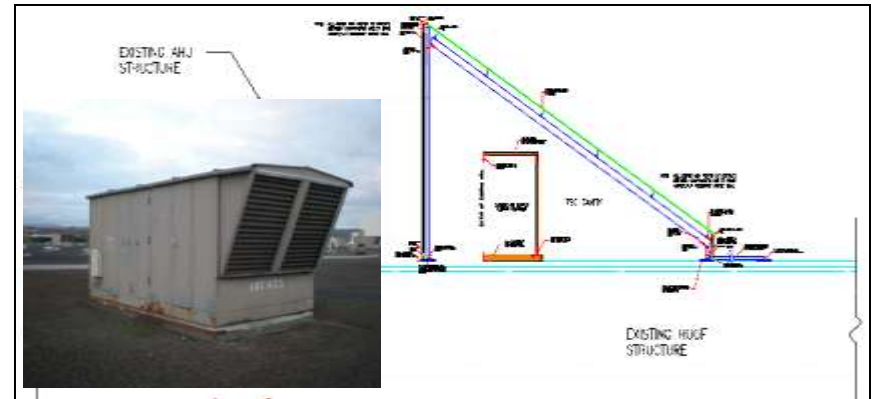


Collector Innovation



- Detailing for a variety of building envelope materials including: brick, steel, aluminium, slate ...

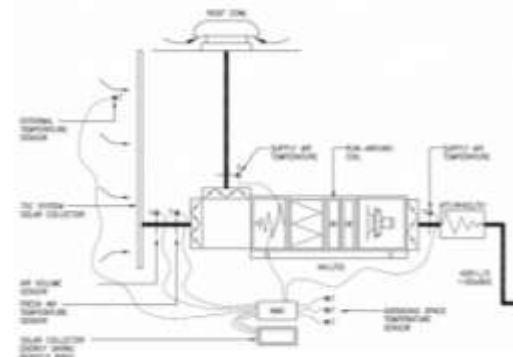
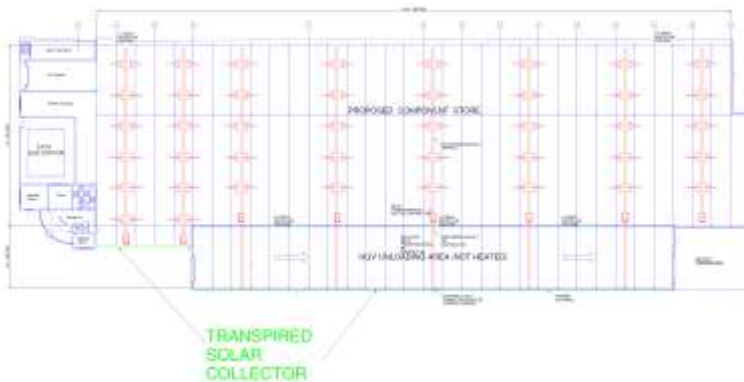
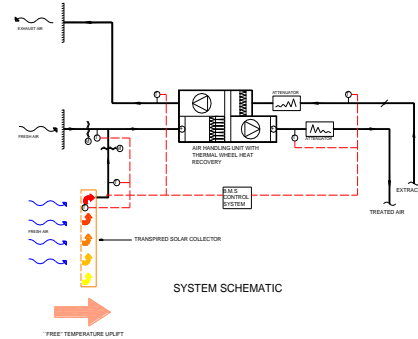
- Detailing for a variety of building aspects including: wall, flat roof, pitched roof, duct ...



System Innovation



- Parallel, series and integrated systems.
- Integration with heat recovery.
- Boost systems.
- Storage systems.
- Dissipation systems including:
 - High volume low velocity circulation of air
 - Ducted jets
 - Fan coil units
 - Under floor heating

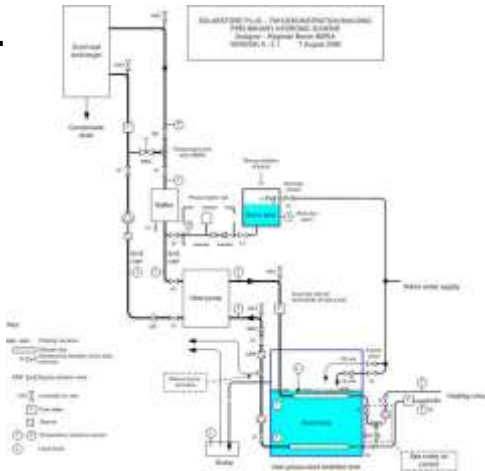


Colorcoat Renew SC® Complimentary Technology for Space Heating and Thermal Storage



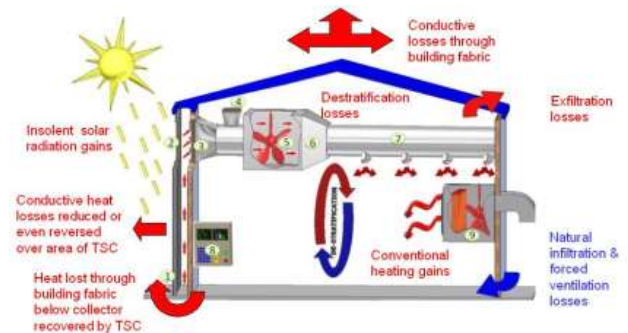
TSC for Heat Storage

- Uses low to zero carbon technologies to generate, store and dissipate renewable heat.
- Heat is exchanged from air to water & then either stored or dissipated directly.
- Provides a system that is capable of delivering 100% of the space heating demand.



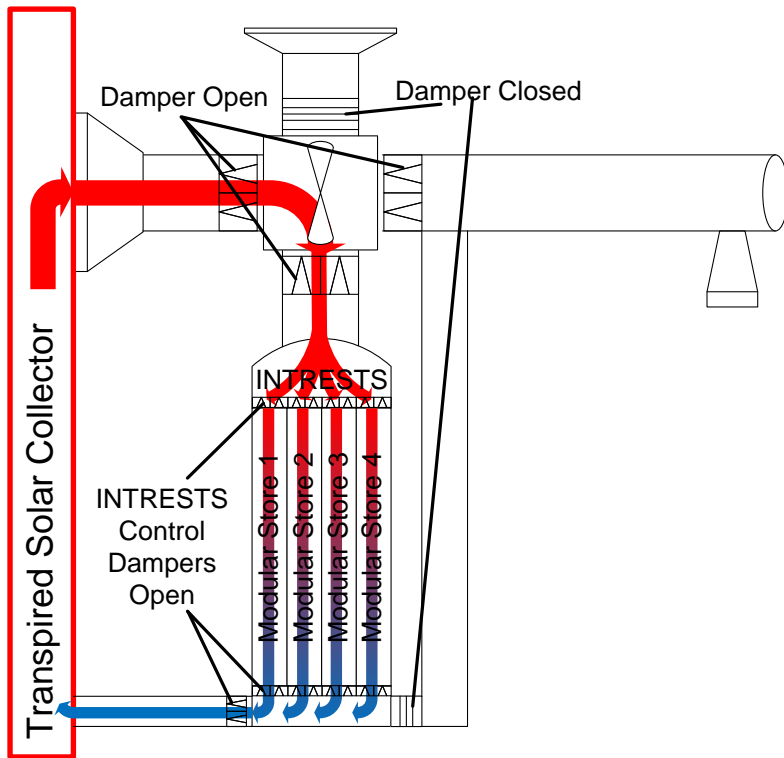
TSC for Space Heating

- Most efficient use of solar thermal heat – typical variant A CoP of 50 to 60.
- Lowest cost solution – typical pay back is 3 to 10 years.
- Provides up to 50% of space heating demand.
- Reduces thermal losses due to stratification and infiltration.
- Provides warm clean fresh air ventilation.



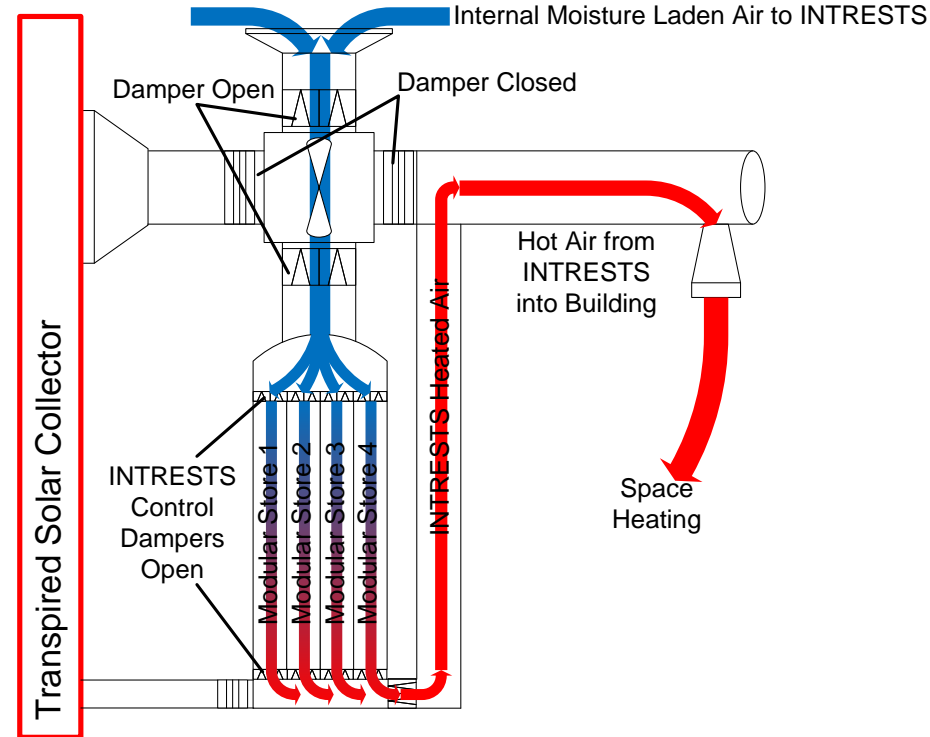
Charge Cycle

INTRESTS + TSC Operation – Charging



Discharge Cycle

INTRESTS + TSC Winter Operation - Discharging



Heat stored via Thermochemical salts

TSC Market Development



Industrial



Commercial



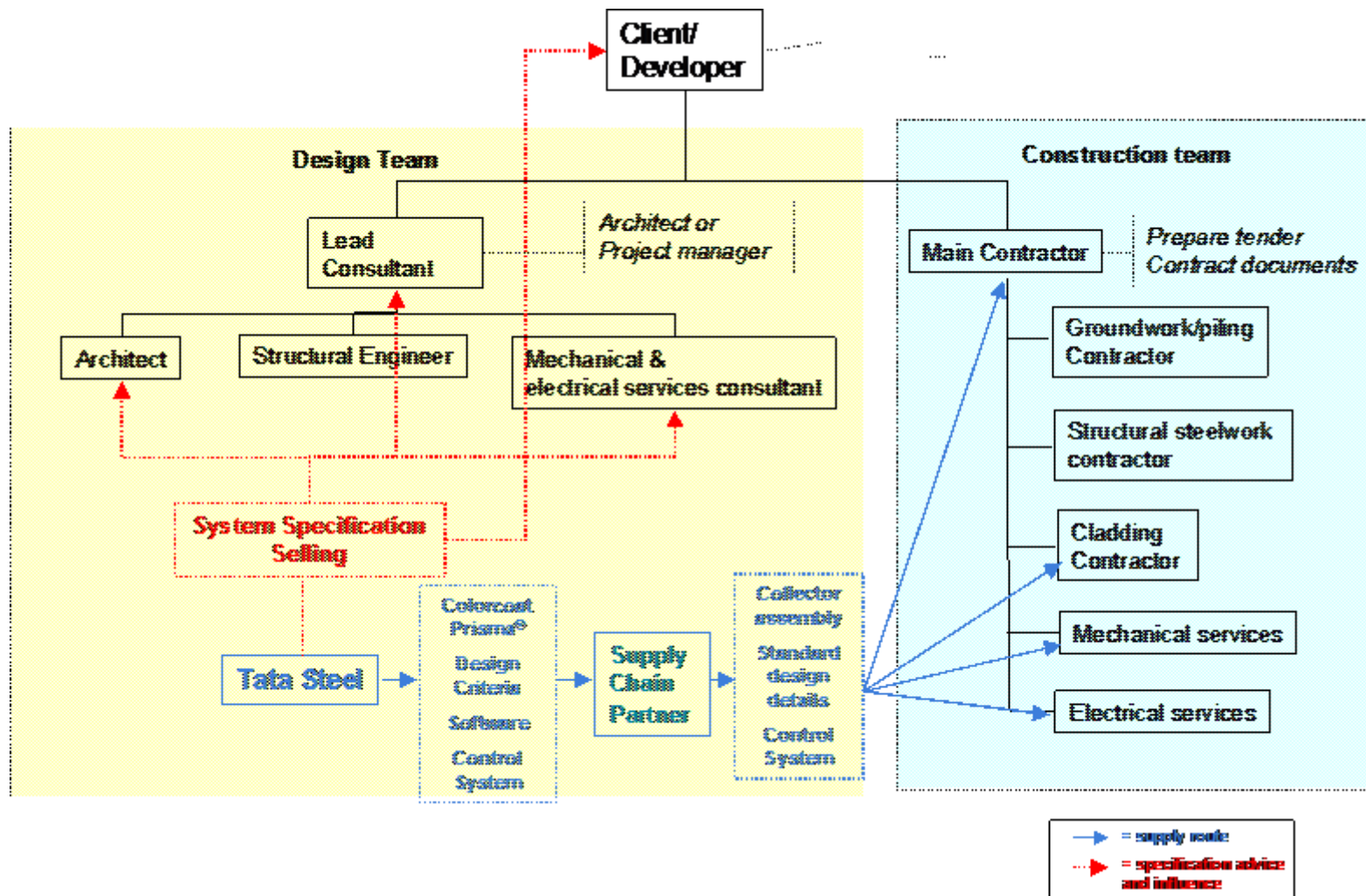
Institutional



Residential



TSC Supply Chain Development



Project engineering & pre-engineered solutions



Fundamental Understanding of TSC Technology

- Building physics gains / losses
- Integration of TSC with HVAC
- Impact of boundary conditions

- Sized HVAC Equipment
- Matched Collector Size Flow & Output
- Pre Defined Value Proposition

Principals of TSC Project Design Engineering

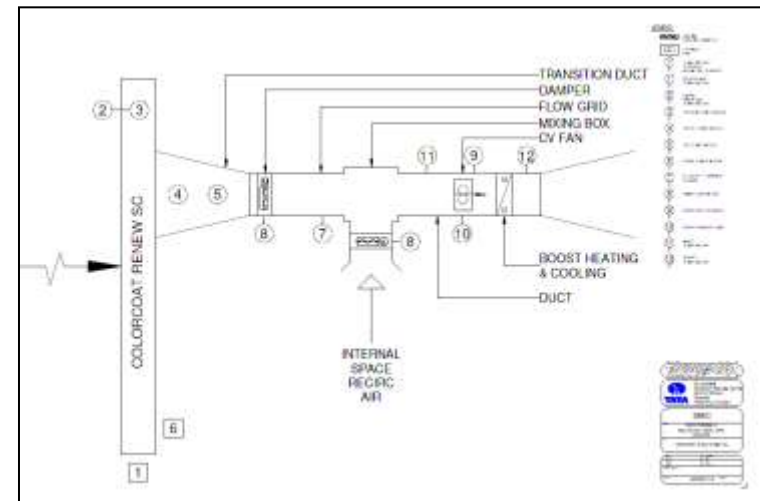
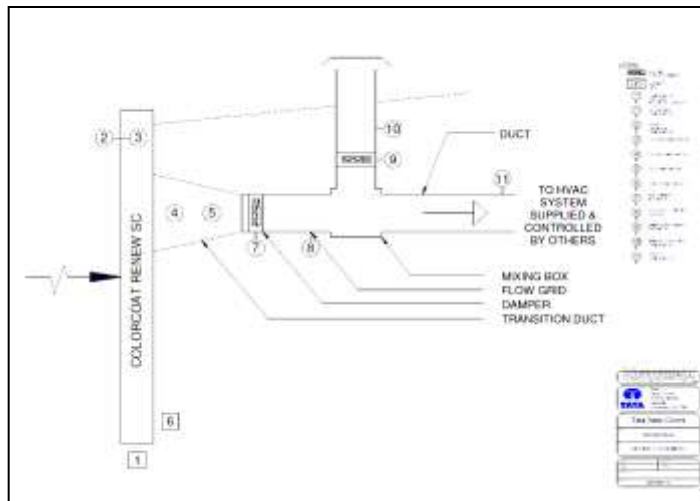
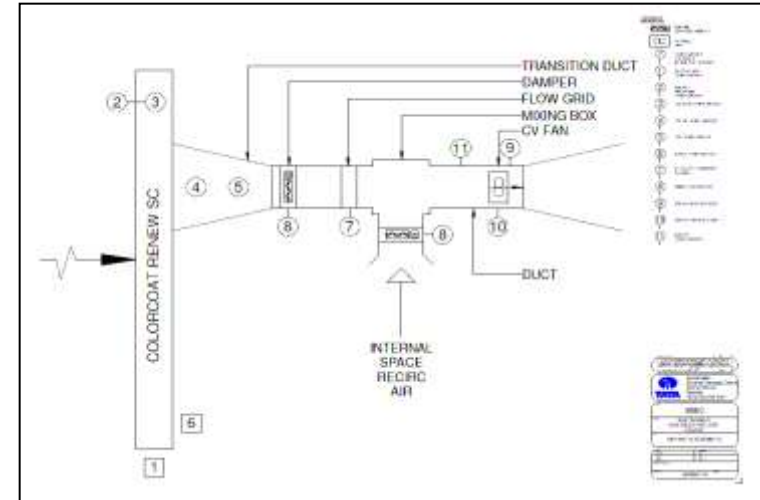
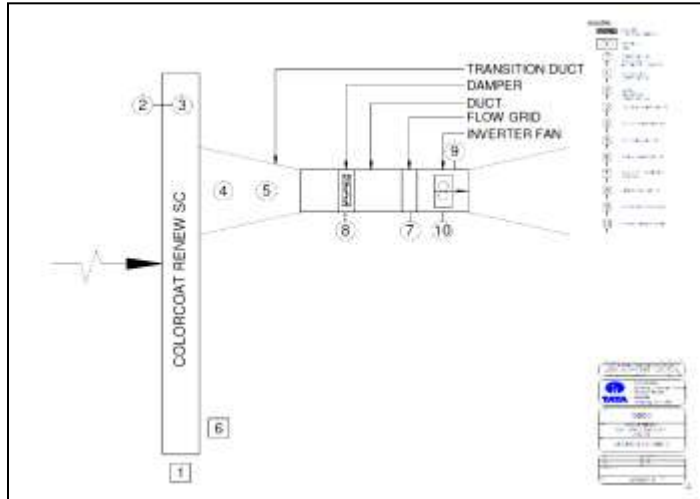
Pre-Engineered Configurations

Matrix of Standard Project Solutions

- Building Physics Principals
- Fluid Dynamics
- SBET Modelling

- Pre-defined HVAC configurations
- Pre-engineered control strategies
- Standard project literature

TSC Gen. 1 Pre-Engineered Variants



Tata Steel Vision



To functionalise the whole building envelope. New build and retrofit



To create buildings that are power stations to help deliver the low to zero carbon built environment

