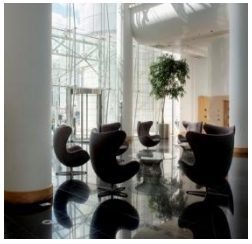
GLOBAL SWITCH




ALWAYS ON GLOBALSWITCH.COM

GLOBAL SWITCH

Data Centre Design Considerations

Kelvin Fong

Managing Director, Hong Kong

Agenda

1. Introduction to Global Switch
2. Customer Requirements
3. Development Strategy and Process
    a) Feasibility
    b) Design Objectives of an Energy Efficient Data Centre
4. Conclusion

1. Introduction to Global Switch

Leading Large Scale Data Centre Owner, Operator and Developer Europe and Asia-Pacific

- Established in 1998
- 3,100,000 sq ft (290,000 sq m) of gross space
- 9 data centres across 7 markets, with two under construction
- Low latency locations in Tier 1 markets
- Investment grade credit rating from Moody's and Fitch
- 100% owned by the Reuben brothers, significant property investors in UK and elsewhere
- Carrier neutral, services neutral, product neutral with access to multiple network providers
- Better than 99.999% historical uptime reliability across the portfolio
- Trusted brand name in the sector
- Strong focus on long-term strategic relationships with customers and suppliers

2. Customer Requirements

Customer Requirements

- Location
- Network connectivity
- Energy cost
- Environmental credentials
- Resilient data centre design
- Proven operational reliability
- Scale of operation
- Total cost of occupancy
- Financial strength of provider
- International presence

Reliance and Reliability: Global Switch – Always On

Working with Customers to Create Energy Efficient Environments

Organisation

Global Switch is committed to energy efficiency, reducing carbon emissions and providing green energy solutions

Data Centre Design

- Commitment to developing sustainable data centres
- Latest innovations applied in design
- Hong Kong expansion targeting a Power Utilisation Efficiency of 1.5

Power

- Energy generated from renewable energy sources
- Sustainable green energy is procured for the Company's own usage
- Offered to customers, where available

Cooling

- Free air cooling, where available
- Increasing 'in-suite' temperature and humidity parameters to improve energy use

Monitoring & Reporting

- Constant monitoring of temperature and humidity systems to ensure targets are exceeded
- Work closely with customers to continually improve energy efficiency

Global Switch,
Always Green

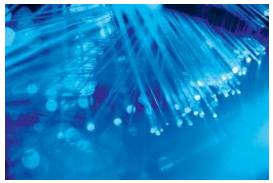
Global Switch Meeting Customer Requirements

POWER IN
MW (10^6)

"Greenness"

VALUE

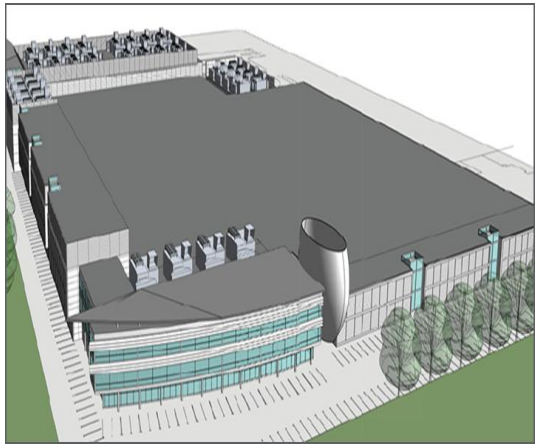
Transformers → Generators
DRUPS
UPS
Suites
Air con
refrigeration
Heat rejection



DATA OUT
Ω W(10^{-6})

Developments in Response to Customer Demand

Amsterdam



Gross Area	275,000 sq ft
Utility Power Supply	45 MW
Number of Technical Floors	2
Power Density	1.5 kW/sqm
Target Design PUE	1.3
Tier Rating	3+

Sydney East

Gross Area	280,000 sq ft
Utility Power Supply	32 MW
Number of Technical Floors	5
Power Density	1.85 kW/sqm
Target Design PUE	1.35
Tier Rating	3+

Singapore Woodlands

Gross Area	270,000 sq ft
Utility Power Supply	32 MW
Number of Technical Floors	5
Power Density	1.4 kW/sqm
Target Design PUE	1.6
Tier Rating	3+

Introducing
Global Switch Hong Kong

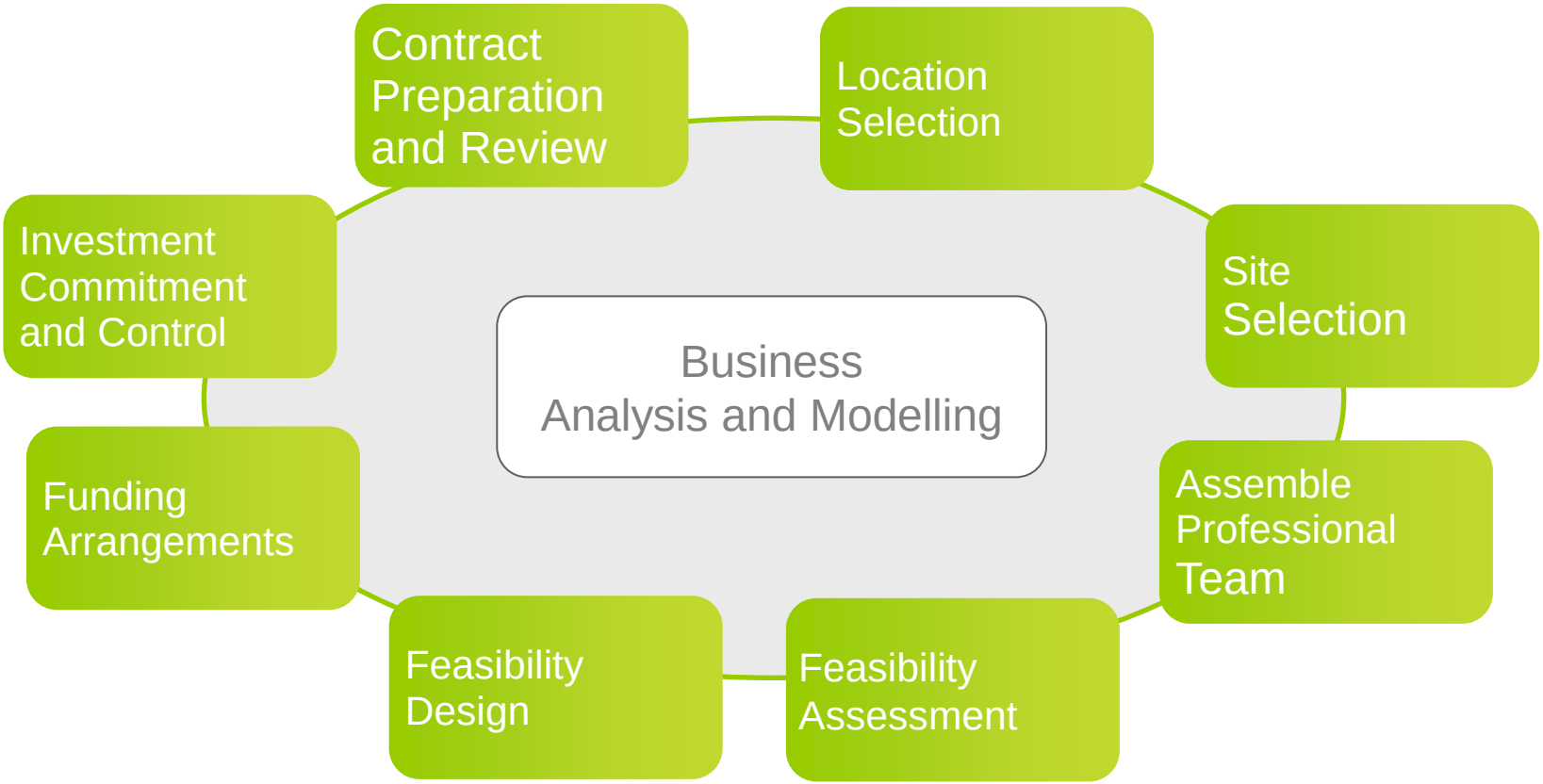
GLOBAL SWITCH

Introducing
Global Switch Hong Kong

- 485,000 square foot of space
- 58MW of utility power, diverse feeds
- Adjacent to the major submarine cable landing stations
- Near the Hong Kong Stock Exchange hosting facility and Hong Kong's main business districts
- High density as standard with flexibility to meet expected customer requirements
- Large and flexible floor plate
- Scalable and customer tailored approach
- Cost effective solutions
- Leading example of an environmentally sustainable data centre - will target a Leadership in Energy and Environmental Design (LEED) Gold Rating, and also a Hong Kong Green Building Council's BEAM Plus Platinum rating
- Target PUE of 1.5

3. Development Strategy and Process
a) Feasibility Phase

Feasibility



Feasibility

Location Selection

- Demand
- Supply

Site Selection

- Power Availability
- Site Size Criteria
- Risk Analysis
- Practical Constraints
- Recommendation

Feasibility Professional Advisors/Team

- Global Switch has exceptionally strong relationships with consultants across both Asia-Pacific and Europe
- At the start of each project, best in class consultants, contractors and suppliers are identified and commissioned
- These key relationships allow information and previous experiences to be leveraged and used for future projects

A selection of companies used by Global Switch for worldwide development projects

International Consultants

AECOM, HPF, aurecon, INEO GDF SUEZ, AWP, Lee Technologies, COFELY GDF SUEZ, sweett, Deerns, TEBODIN Consultants & Engineers, DSCO group, Turner & Townsend, EC HARRIS BUILT ASSET CONSULTANCY, WSP

Contractors

ABB, DELTA, Johnson Controls, amec, ED EURO DIESEL, LINKFORCE ENGINEERING, BOUYGUES CONSTRUCTION, Gammon, mace, Hastie Group, MITIE, COMSA EMTE, Imtech, Strukton

OEMs and other suppliers

AIREDALE, F G WILSON, Schneider Electric, AVK SEG (UK) LTD, Honeywell, SIEMENS, Carrier, hitzinger, STULZ, CAT, mtu, tyco Fire & Security, ADT, Cummins, PILLER Power Systems, UNIFLAIR, DAIKIN, EATON, RC GROUP, WÄRTSILÄ

Relationships with some of the world's largest and most respected consultants and contractors

Feasibility

Feasibility Design

- Define site and design parameters
- Customer demand profile
- Budget parameters

Feasibility Assessment

- Land acquisition with or without improvements
- Building solution desk top modelling
- Customer pipeline
- Business case modelling

Feasibility

Funding Arrangements
- Development Cash Flow Modelling
- Supply

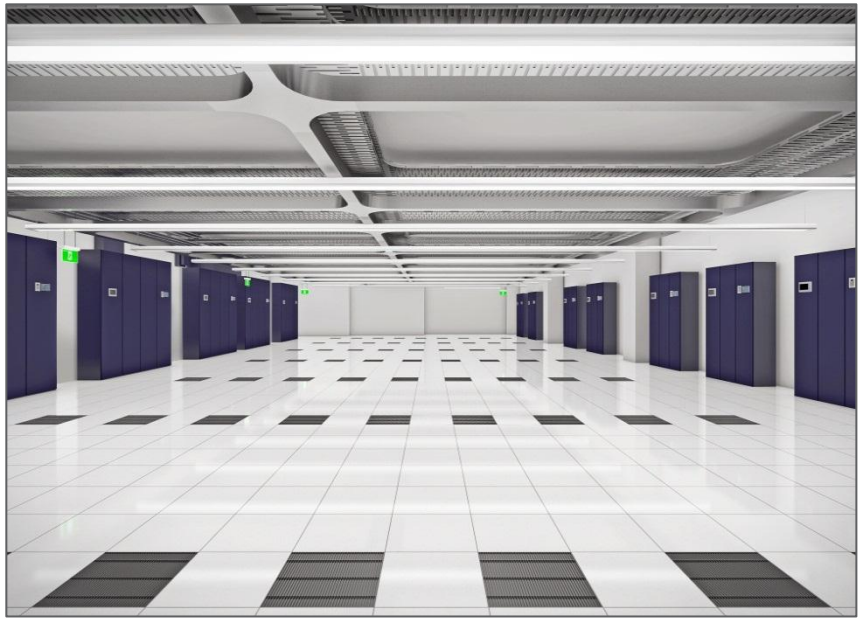
Investment Commitment and Control
- Business Plan
- Review and analysis
- Approval

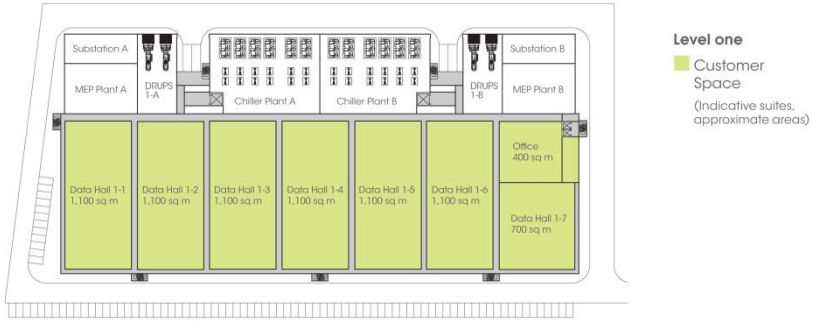
Contract Preparation and Review
- Power contract
- Legal title
- Advisor appointment contracts
- Primary contractor contract preparation
- Procurement method and associated contracts

Meticulous Approach and Analysis: Global Switch – Always Thorough

3. Development Strategy and Process
b) Design Objectives of an Energy Efficient Data Centre

Data Centre Design Objectives

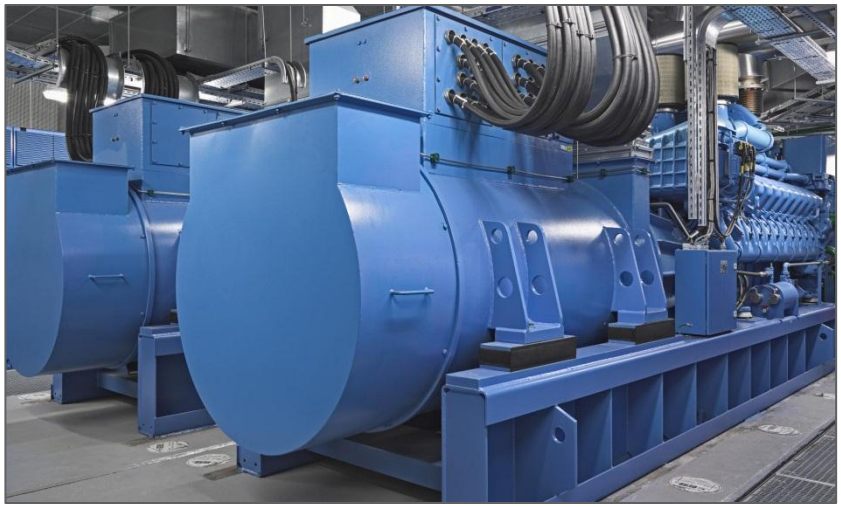




Architecture/Environment

- Provide ‘’state of the art’’ technical IT space in Hong Kong
- Incorporate green concepts that support local communities
- LEED and BREEAM accreditations
- Minimise the impact of the building on the environment
- Provide best in class space utilisation in terms of gross to net technical space
- Build better than Tier 3 standard
- Minimised waste heat, so low PUE
- Offer a scalable environment for customers with flexible densities across the facility in accordance with ASHRAE TC 9.9 standards
- Engage stakeholders and provide an enhanced experience for both customers and the operations team
- Structured grid designed to suit cooling unit capacity

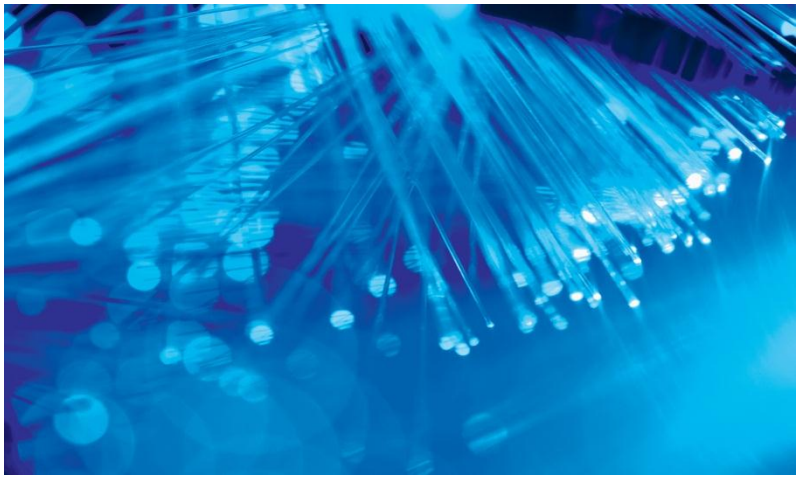
Data Centre Design Objectives



Power and Cooling

- Maximise the resilience and energy efficiency on the technical space layout together with power and cooling systems
- Industry leading Power Usage Effectiveness (PUE), with a Hong Kong target of less than or equal to 1.5
- Create a low risk data centre environment

Data Centre Design Objectives



Connectivity

- Provide diverse routes for carrier neutral connectivity maximising local connectivity peering performance
- Provide a comprehensive structured cabling solution from diverse fibre entry points

Security

- Security systems are installed to highest standards from perimeter through to technical space

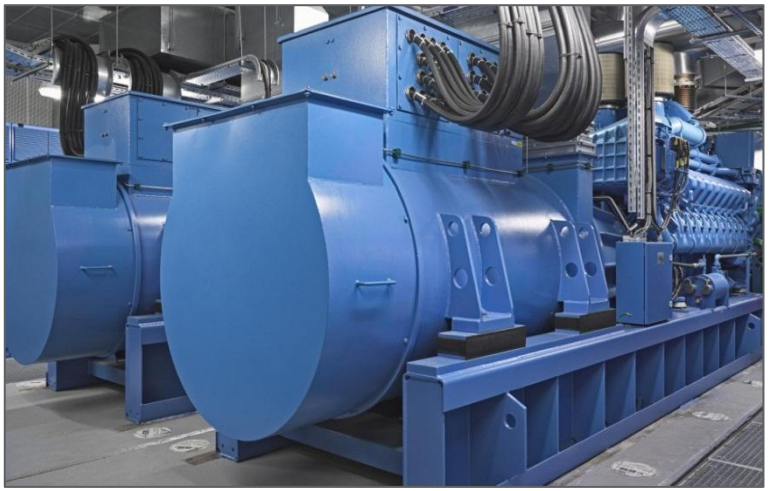
Innovation to be Adopted

- Global Switch engages with industry thought leaders and specialists to adopt proven efficient solutions.
- Extensive 3D modelling of building and technical infrastructure
- Global Switch standard studies:
  - Computational fluid dynamics simulations of cooling production and distribution systems
  - Power systems load flow analysis
  - PUE modelling
  - Energy Efficiency Ratio
  - Resilience
  - Extensive Discrimination Studies

Innovation Being Considered

Diesel Rotary UPS's (DRUPs)

A design norm for Global Switch deployed in numerous locations, now being recognised by other data centre users



Industry report– Bernie Woytek of Gensler– September 2013

One of the building's innovations is a clean back-up power system. General Motors (GM) switched from a space-hogging, battery-based Uninterruptible Power Supply to one powered by mechanical fly wheels and a diesel engine. Used in less than 2% of datacentres globally, it reduces emissions, noise pollution and fuel consumption. Plus, by avoiding the use of the equivalent of 12,000 car batteries, GM eliminated the heating and cooling systems required to keep the batteries at their optimal temperature.

"We have built 5 million sq ft of datacentres around the world and this is one of the first ones incorporating this flywheel-powered back-up technology," said Bernie Woytek, senior associate with Gensler, a global architecture, design, planning and consulting firm. "It essentially eliminates a football field-sized room of batteries."

Innovation Being Considered

Environmental aspects:

- The GSHK1 building will be visually striking
- Space utilisation: Maximum 50% plant space to technical data space (compared to a typical 70% – 30% traditional design)
- Achieved by constructing the building around the plant and technical space rather than the other way round
- The proposed DRUPS eliminate the need for batteries and the space they would occupy and removes environmental factors associated with this technology
- Proposed rain water harvesting for on site use reduces the burden on local infrastructure

Conclusion

Global Switch will deliver to the Hong Kong business community a 1st class facility:

- **Experience** - Longevity in the market
- **Green credentials** - With power and cooling design and implementation
- **Customer relationships** - Low customer churn. Knowledge of future customer requirements
- **Commitment to operational excellence** - Continuously improving performance, running mission critical facilities through our Critical Environments Programme
- **Proven development delivery** - Projects delivered within budget and timescale
- **Team** - Highly respected within the industry
- **Supplier relationships** - Continuous improvement and innovation, adding value to the customer proposals
- **Financial strength and flexibility**- A private company capable of making decisions unrestrained by market regulation

Thank you for Listening

Questions

KELVIN FONG
Managing Director, Hong Kong
D +852 3750 7575 M +852 9027 9293
kfong@globalswitch.com

GLOBAL SWITCH, **ALWAYS GREEN**