Light Rail Systems
轻的铁路系统

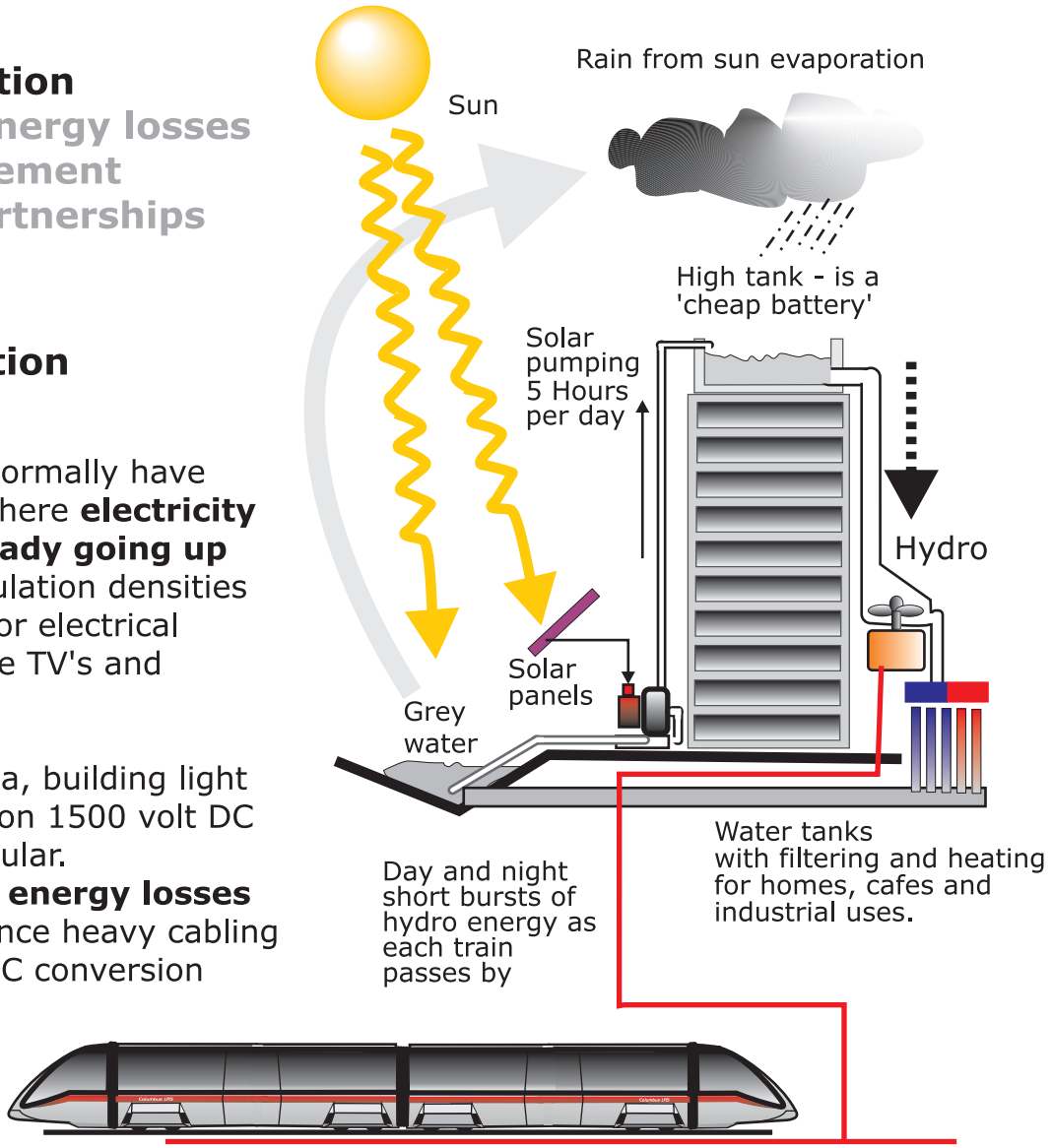
Core factors:

1. **Energy generation**
2. **Reduction of energy losses**
3. **Energy management**
4. **Technology partnerships**

Energy generation

A. Light rail systems normally have inner city routes, where **electricity demands are already going up** with increased population densities and their demand for electrical consumer goods like TV's and microwave ovens.

B. In the cities of China, building light rail systems,based on 1500 volt DC systems is also popular.
This can create **big energy losses** in the (i) long distance heavy cabling and the (ii) AC to DC conversion infrastructure.



C. Columbus Light Rail Systems have designed **local electricity supplies** that use solar, rain from evaporation and other waste energy sources to store energy, and with hydro generation, to provide (i) short bursts of high energy very fast and (ii) value-added services like clean water for drinking, including water heating, food preparation and other industrial uses.

Summary:

Combine energy needs into 1 local system
Aim to maximise efficiency
Design system to reduce costs
Provide extra community services
Reduce greenhouse gases

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Understanding the problems of current light rail technologies

A. **Air conditioning is mounted in the roof.**

Higher roof line - increased wind drag
Higher centre of gravity - possible instability
Higher profile - larger tunnels needed
Transport of air conditioner wastes energy

B. **Pantograph can be removed**

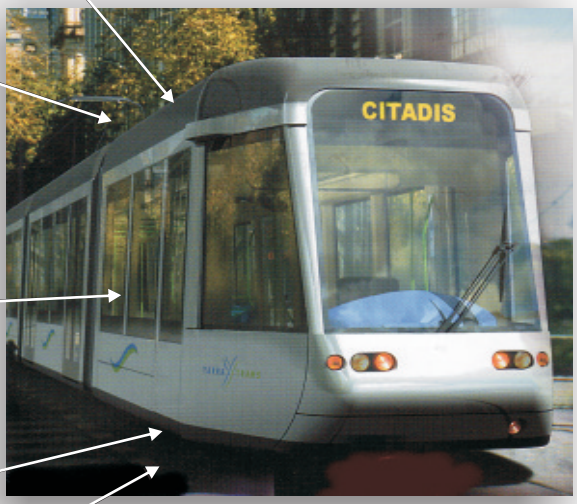
Energy delivery by other systems saves energy and removes the cost for expensive and unsightly overhead wires.

C. **Large glass areas**

Large areas of glass may not be suitable for the wide range of Chinese climates

D. **Wheel noise**

Traditional wheel designs have large energy losses when going around corners.



Shown above is the *Alstom Citadis™,* another example of new generation light rail systems

E. **Optimised active & passive braking systems**

Raising the track height of stations and smart light rail system operations can considerably reduce braking and save energy.

F. **Run trains at slower speeds**

With less time at stations, the trips take the same time at save energy.

Summary

Better engineering can save energy
Better track construction can save energy
Better train operations can save energy

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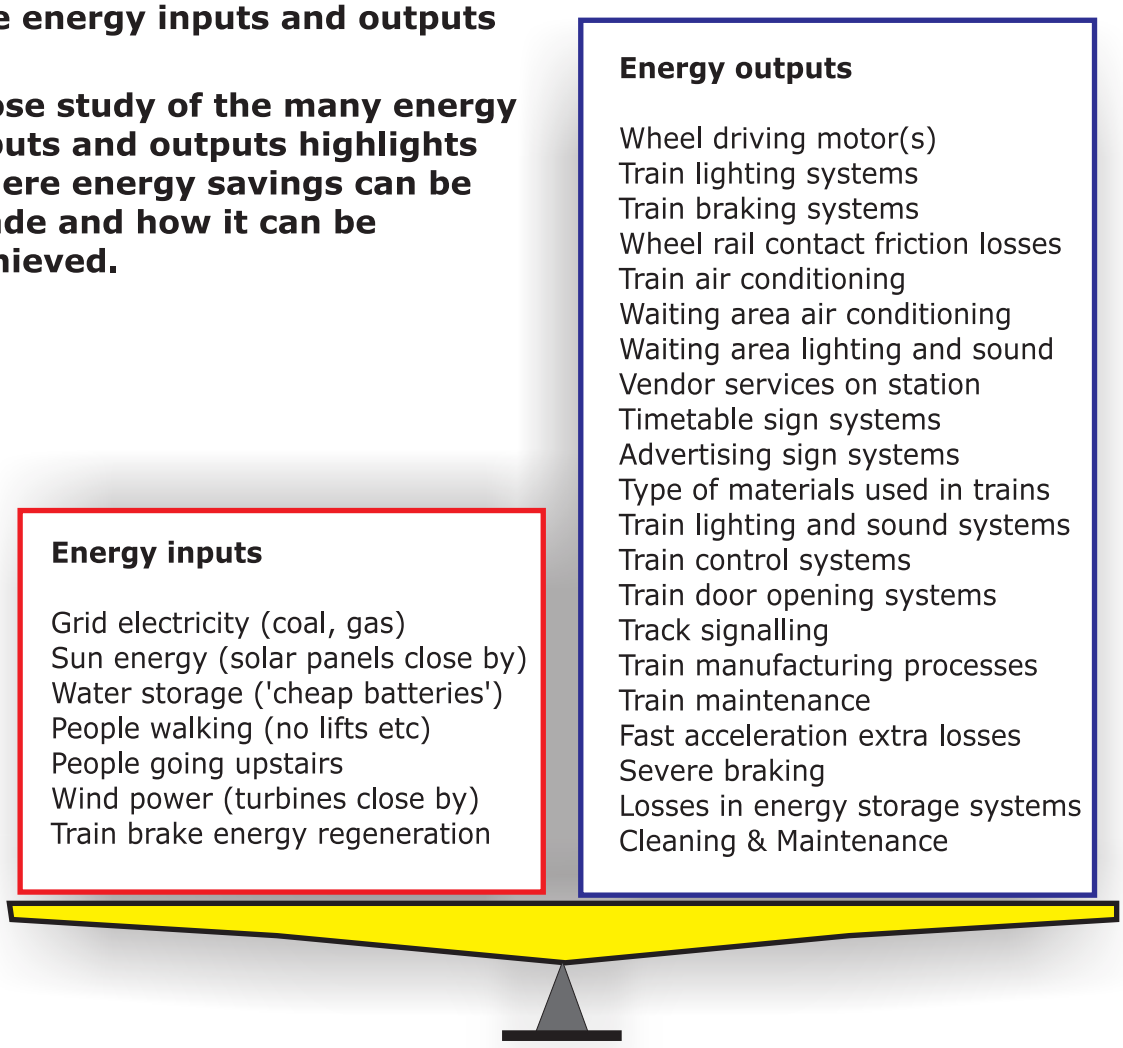
Energy management success requires a complete evaluation

A. **Energy management starts with an understanding of all the energy inputs and outputs**

B. **Close study of the many energy inputs and outputs highlights where energy savings can be made and how it can be achieved.**



Summary:

Energy reduction strategies can start with one small item

New solutions for old problems should also be considered

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Next steps

A. **The Columbus Group has been involved in the research and development of better rail transport systems for 32 years.**

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Donald Yates
CEO / R&D Business
BAppSc BCommEng CertRenewEngy
columbusgroup @ iinet.net.au
61 8 9379 9479
Fax 61 8 9379 9489
Success Hill, 6054
Australia

The Columbus Group has developed a wide & diverse range of specialised technologies, such as

(i) ticketing communications
(ii) automated mining,
(iii) energy saving building products,
(iv) storm water harvesting,
(v) smart plastic lightweight batteries,
(vi) award winning industrial control software
(vii) renewable energy micro hydro community systems, and
(viii) light rail transport sub-assemblies and complete packages.

B. **Technology partnerships to access Columbus Group's R&D packages**

The Columbus Group is keen to (i) determine AREAS OF INTEREST with those companies who are, or wish to be, in light rail systems, and (ii) all projects. both large and small, are of interest to us.

The COLUMBUS LRS package can be SOS (steel wheels on steel rail) or POP (pneumatic tyres on pavement). Detail on request.

Summary:

The Columbus Group is interested in contributing to the exciting Chinese Light Rail Industry, both within China and exported to the world.

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