


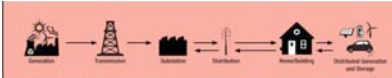
New Energy Technologies

AVICC Convention
Friday, April 9, 2010

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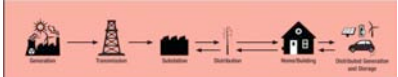


New Energy Technologies

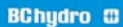


- Large scale energy sources**
 - Solar photovoltaic
 - Wind
 - Ocean: tidal & wave
 - Geothermal
 - Biomass & biogas
 - Small hydro, kinetic hydro
 - Waste to energy
- Energy management**
 - Smart grid for reliability, automation, optimisation
 - Storage for power quality and efficiency
- Residential and commercial energy**
 - Building designs and retrofits
 - Solar thermal
 - Geoexchange
 - Heat exchange
- Consumer products**
 - Electric vehicles
 - Intelligent appliances
 - Home energy management

Energy Sources





- Large scale energy sources**
 - Solar photovoltaic
 - Wind
 - Ocean: tidal & wave
 - Geothermal
 - Biomass & biogas
 - Small hydro, kinetic hydro
 - Waste to energy

Solar Photovoltaic




- What:** panels that capture solar energy
- Where:** Unshaded south-facing rooftops or fields
- Scale:** variable depending on location. Can be deployed in whole communities

Biomass and biogas

- Biomass combustion:** combustion of solid wood to create steam that drives a turbine (large scale)
- Biomass gasification:** 'cooking' of solid wood to a synthetic natural gas that can be cleaned and use to drive an engine or gas turbine generator (medium scale)
- Biogas:** digestion of organic wastes to produce biogas that can power a generator (small scale)

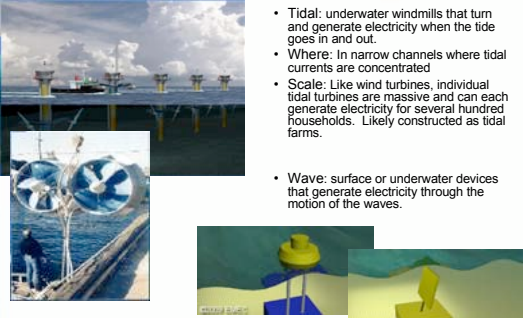
Wind Turbines

- What:** Hilltop wind turbines catch strong winds
- Where:** large fields, shoreline cliffs, or hilltops.
- Scale:** 1 large 80m tall turbine = 350 – 500 homes

Tidal Turbines & Wave energy

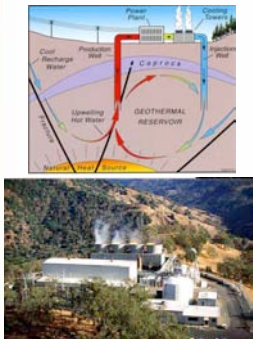
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- Tidal: underwater windmills that turn and generate electricity when the tide goes in and out.
- Where: In narrow channels where tidal currents are concentrated
- Scale: Like wind turbines, individual tidal turbines are massive and can each generate electricity for several hundred households. Likely constructed as tidal farms.
- Wave: surface or underwater devices that generate electricity through the motion of the waves.

Geothermal


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- **What:** tapping into underground reservoirs of very hot water to drive a steam turbine.
- **Where:** 'volcanic' areas (only specific areas in BC)
- **Scale:** usually large (~50 MW)

Small Hydro, Kinetic Hydro


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- Small hydro: water diverted from stream to turn a turbine located downhill (variable scale)
- Kinetic (in-stream) hydro: vertical or horizontal axis turbine sits in stream and uses velocity of water to generate power

Waste (MSW) to Energy

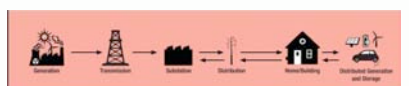
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- **What:** combustion of separated wastes to generate steam or synthetic gas to drive a turbine.
- **Where:** at or near garbage processing facilities or near a heat customer
- **Scale:** big, can support >40,000 people

Energy Management

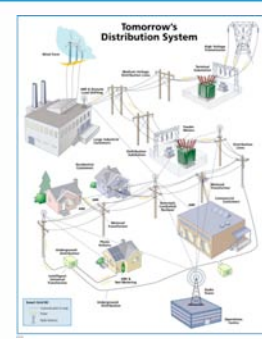
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- Energy management
 - Smart grid for reliability, automation, optimisation
 - Storage for power quality and efficiency

Smart Grid Infrastructure

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Energy storage

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- Critical for integration of large amount of intermittent energy sources e.g. solar, wind, wave
 - Pumped hydro, compressed air, flywheel, batteries



Residential and Commercial Energy

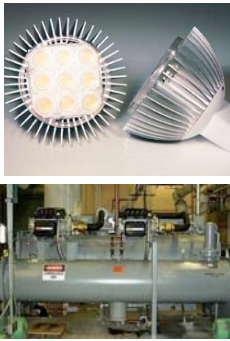
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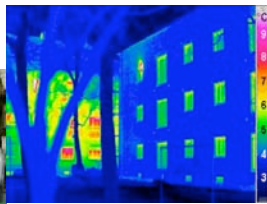
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Buildings

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- Retrofits and upgrades to reduce energy use in existing buildings by 10%, including envelope, lighting & HVAC
- Design and construction of high performance buildings



Solar Thermal

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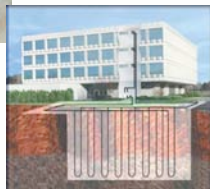
- Solar thermal: Solar collectors heat water or air for use in buildings
- Where: South-facing roof or exterior walls
- Scale: Building level

Geexchange

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- **Geexchange:** residential or commercial building scale using the temperature differential between the earth surface and below to provide heating and/or cooling.



Waste Heat Capture

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- Industrial: Capture waste heat from industrial processes as input to a district energy system
- Where: Industrial sites with large process heat loads, e.g. cement kilns, lumber drying, etc.
- Scale: Medium to large source of heat



- Commercial: Capture waste heat from building exhaust air and large refrigeration loads, e.g. ice rinks, supermarkets, data centres, etc.
- Where: Commercial buildings, shopping centres, recreation facilities
- Scale: Building level waste heat recovery.

Sewer Heat Recovery

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- What: Heat pumps used to extract heat from municipal sewer system
- Where: Large sewer trunks, pump stations or outflow pipes
- Scale: Small to large. Can range from home-size heat-pumps extracting heat from local sewer main, to large plants at pump stations.



Consumer Products

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- Consumer products
 - Electric vehicles
 - Intelligent appliances
 - Home energy management

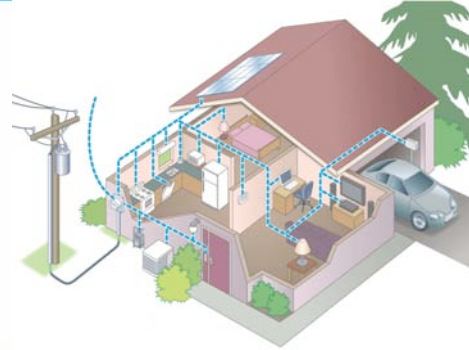
Electric vehicles

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Smart appliances

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Home energy management

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Questions?

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