

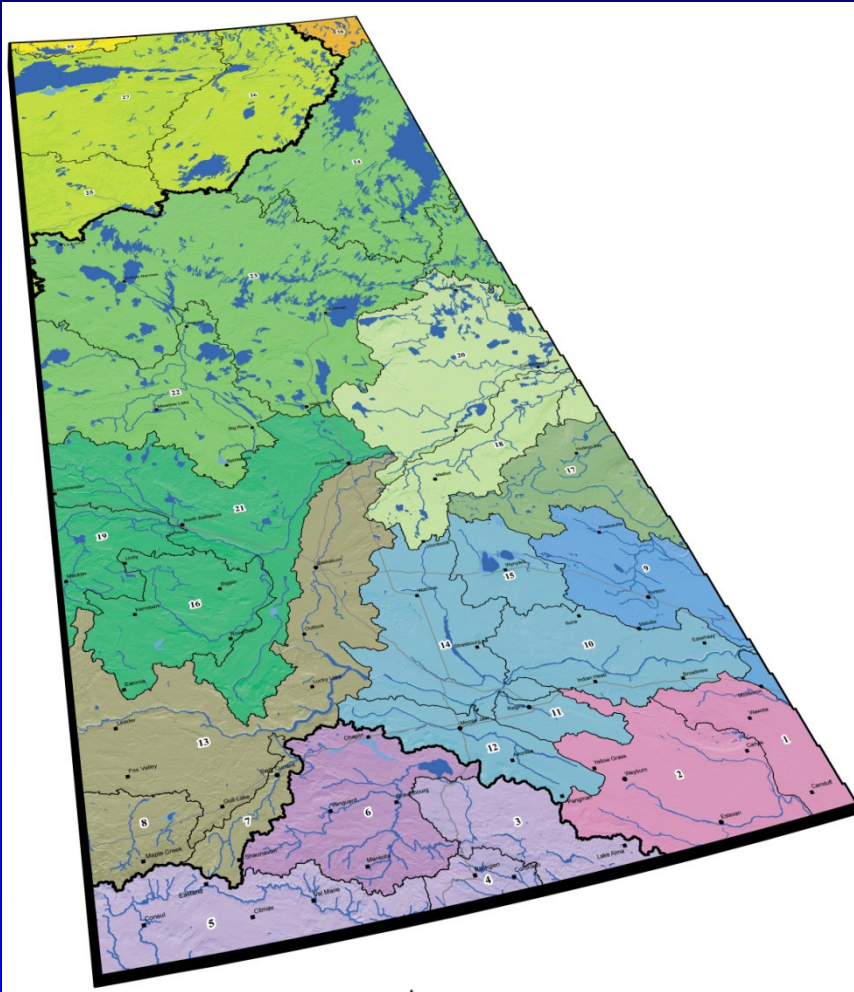
Water Use in Saskatchewan's Energy Sector

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Outline

- Water Allocation in Saskatchewan
- Current Water Use in Energy Sector
- Future Water Use by Energy Sector
- Conclusions

Saskatchewan Waters



- Three continental drainage basins
 - Arctic
 - Hudson Bay
 - Missouri
- Transboundary watersheds
- Four ecozones
 - Taiga Shield
 - Boreal Plain
 - Boreal Shield
 - Prairie

image from SWA

Water Allocation and Use

- Western water law
- Earliest licences in 1894
- Licences granted for specified purpose
- Purposes include municipal, domestic, irrigation, industrial, and other.
- Up to 5,000 m³/yr (5 dam³) without licence
- Allocation by groundwater or surface water and by major basin

Water Use

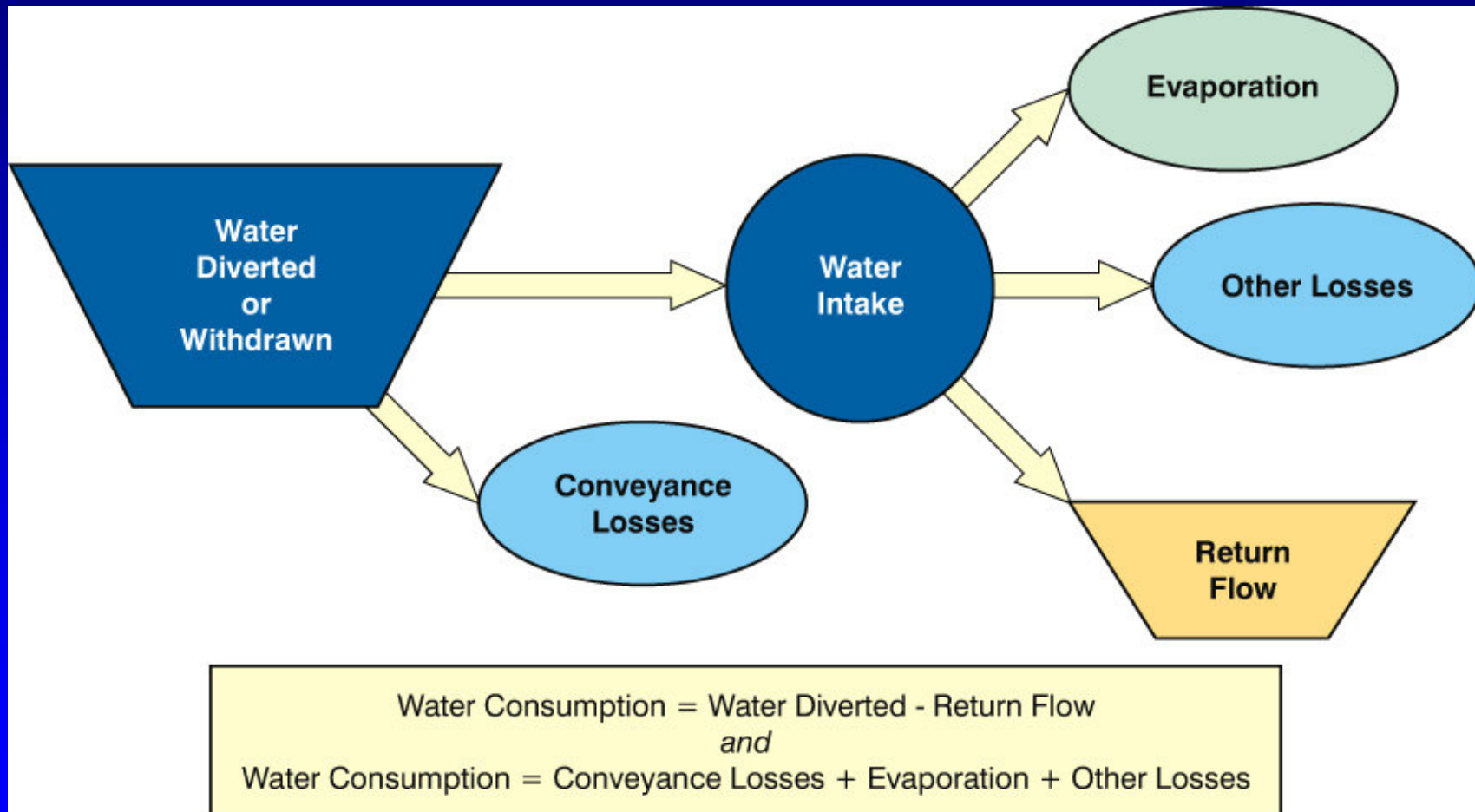


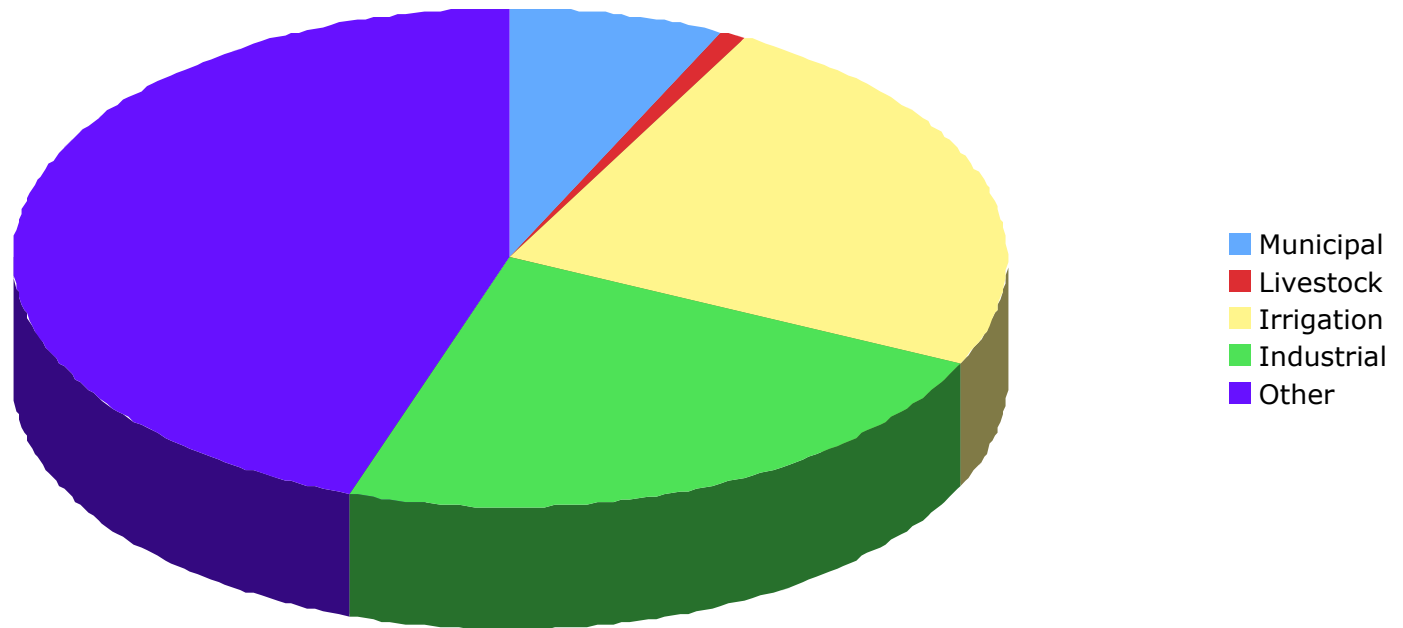
image from PRSRB, 2009

Allocation Summary

- Licensing system is robust
- Water withdrawal and consumption data generally poor
 - industrial users in the energy sector may pay user fees, report usage
- Southern basins are highly allocated

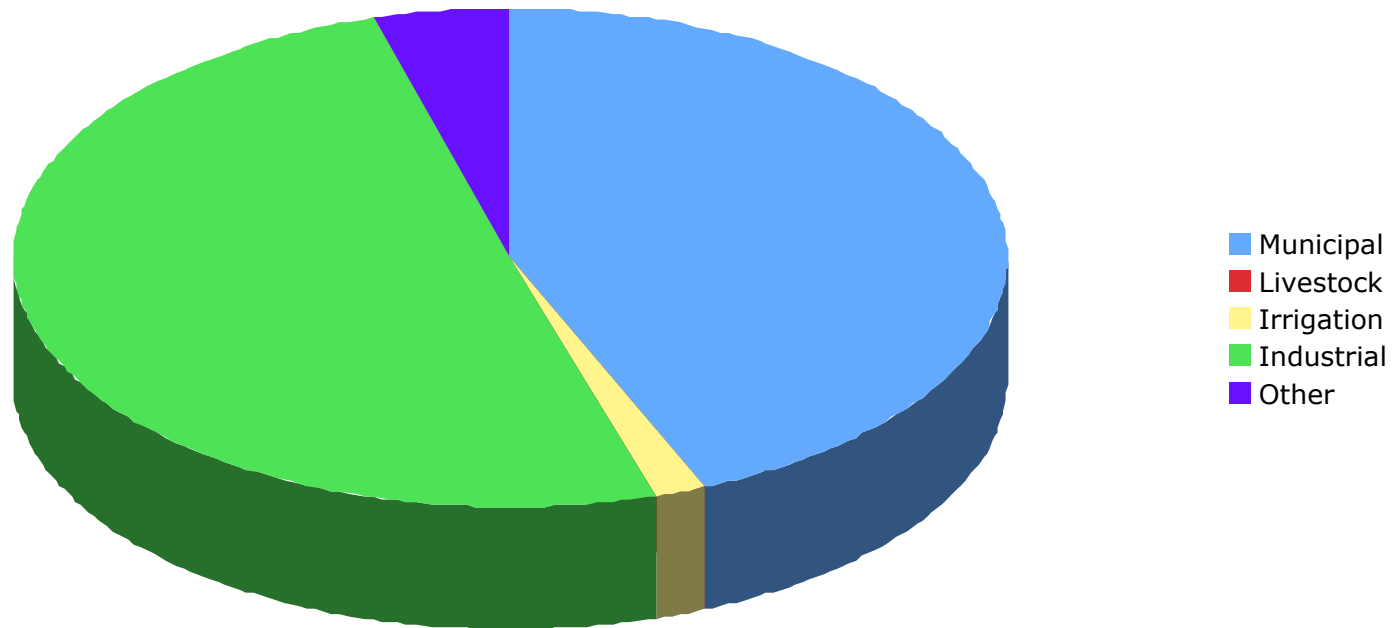
Water Use in Saskatchewan

Surface Water Allocation



Water Use in Saskatchewan

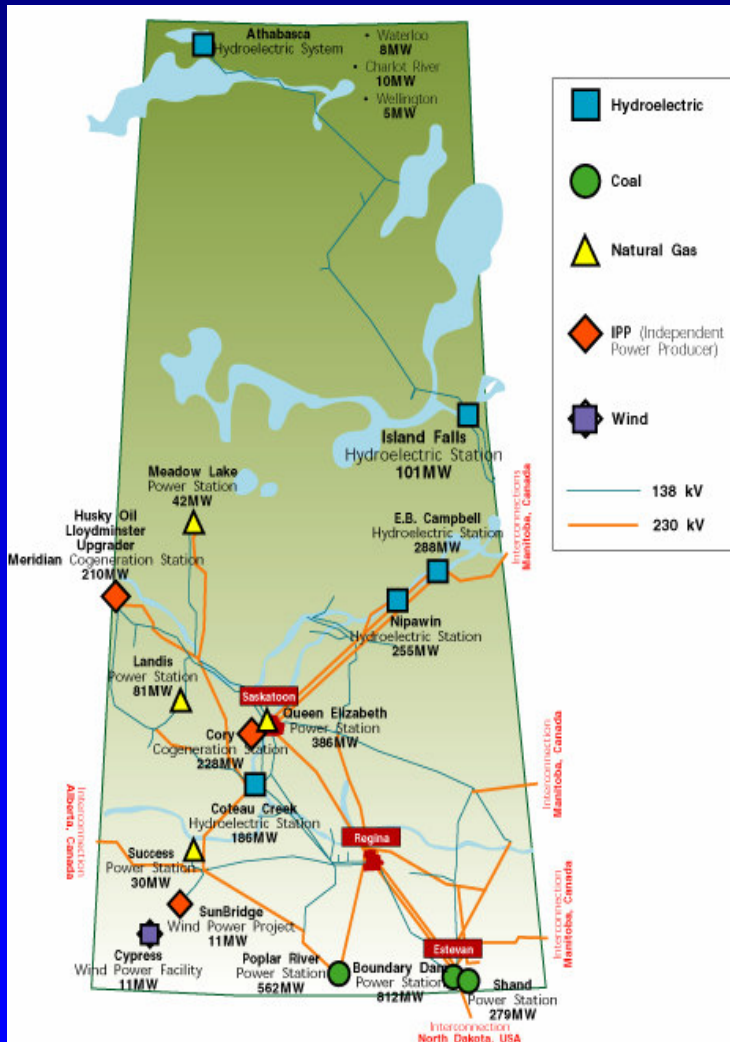
Allocation from Groundwater



Water Users in Energy Sector

- Electricity Generation
 - hydro
 - thermal coal
 - thermal gas
- Oil and Gas
- Biofuels

Electricity Generation



- Thermal coal stations used for baseload
- Thermal gas used for peaking
- Hydro stations used to extent of water availability - midload and peaking

Water Consumption - Electricity

- Hydro - major water user but little consumption
 - SaskPower pays water rental
- Thermal Coal - licences for 20,000 dam³ from surface water, 15,000 dam³ from groundwater
 - SaskPower pays cooling water charge
- Thermal Gas - water consumption small, difficult to determine
 - Saskatoon licence

Oil and Gas

- About 4000 dam³ allocated from surface water, 50,000 dam³ from groundwater
 - gas cavern washing
 - enhanced oil recovery
 - process water
- Use of non-potable water

Biofuels

- Five ethanol from wheat plants and one biodiesel from canola plant
- Widely distributed
- Consumption of 4300 dam³ from surface water

Future Water Use in Energy Sector

- Electricity Generation Future
 - decommission existing thermal coal stations
 - wind-hydro complementary operation
 - import hydro from Manitoba
 - polygeneration
 - thermal coal with CCS
 - nuclear

Energy Conservation

- By far the least expensive form of 'new' capacity
- No implications for water use
- Incentives/ disincentives

Future Electricity Generation

- Water consumption is negligible for wind, hydro and small for thermal gas and polygeneration
- CCS thermal coal stations consume more water than non-CCS ones
 - stations are in water short areas
- Nuclear plant would use evaporative cooling
 - water requirement for 1000 MW

Future Oil and Gas Development

- Conventional
 - Water use will decline in the long term
 - currently declining in Alberta
- Oil Sands
 - in-situ recovery is proposed
 - water use about 0.5 barrel/barrel oil
 - non-potable opportunities

Biofuels

- Plants are not viable without subsidies
- Water consumption is small
- Important not to cluster plants

Conclusions

- Water consumption in the energy sector is significant and could increase
- Opportunities for increased use of non-potable water
- Consider industrial water pricing incentives
 - higher prices in water short areas
 - tier non-potable water charges

More information

www.environmentalsociety.ca

Thank you for your attention.