



Securing water for oil and gas operations: Challenges and opportunities

Tara Payment
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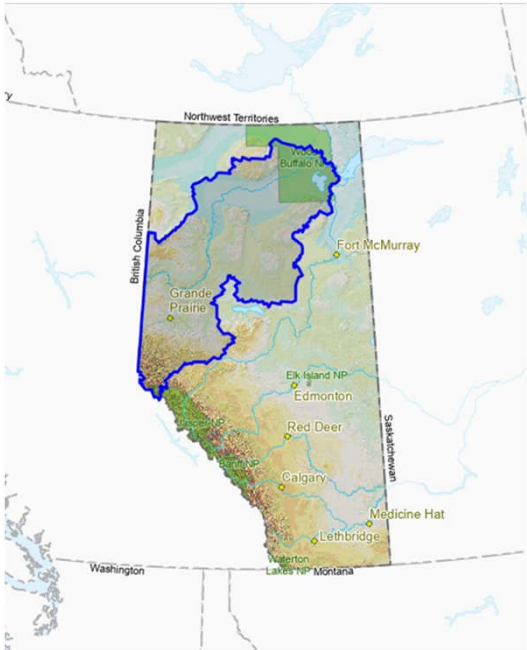
CAPP CANADA'S OIL & NATURAL GAS PRODUCERS

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Presentation outline

- Oil and natural gas resources and production within the Mighty Peace
- Water allocations
- Water sourcing
- Water licensing
- Water storage
- Water conveyance
- Water security
- Advocacy areas



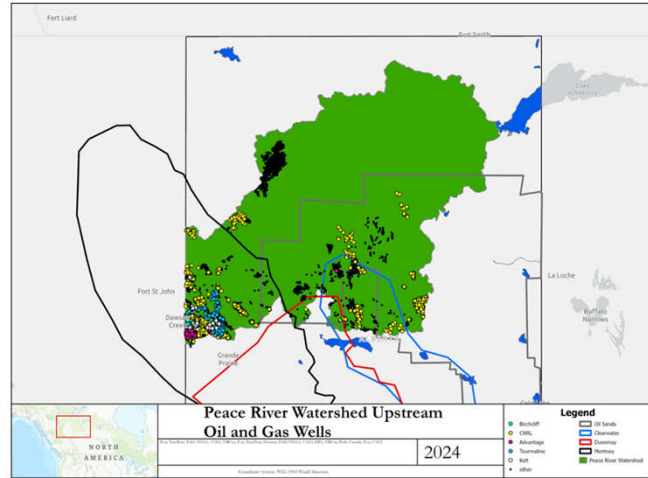
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Resource plays and top 5 producers in the Peace R. watershed

- Watershed contains world-class resource plays - Montney, Clearwater, Duvernay, and the oil sands
- In 2023, average of 377,304 BOE/d total hydrocarbons were produced within watershed
- Most active operators in the watershed:
 - Birchcliff Energy
 - Canadian Natural Resources
 - Advantage Energy
 - Tourmaline Oil
 - Kelt Exploration

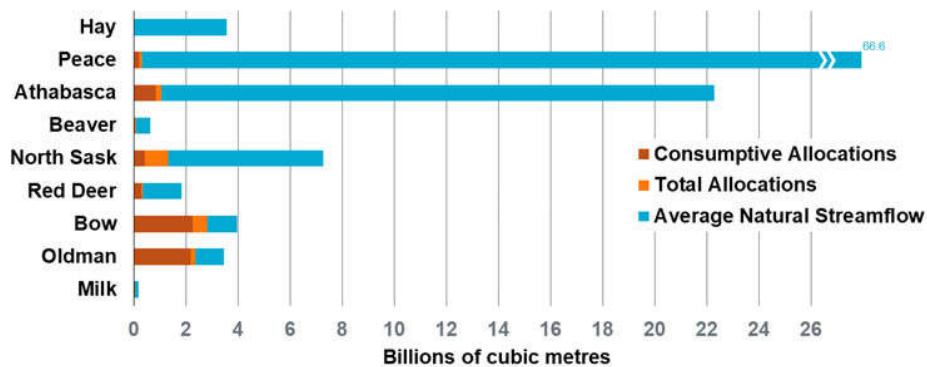


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Surface water allocations and average water availability

2023 Surface Water Allocations by River Basin Compared to Average Natural Streamflow Volumes



Source: <https://www.alberta.ca/drought-water-allocation-and-apportionment>

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Peace region basins – oil & gas allocation volumes (2023)

- **Peace R. basin**
 - 80,961,021 m³
 - 0.1% of mean annual flow, 0.2% of 1:10 year low flow
 - **Smoky R. basin**
 - 66,866,220 m³
 - 0.6% of mean annual flow, 1% of 1:10 year low flow
 - **Wapiti R. basin**
 - 13,513,155 m³
 - 0.5% of mean annual flow, 0.7% of 1:10 year low flow
 - **Little Smoky R. basin**
 - 24,631,132 m³
 - 1.7% of mean annual flow, 3.2% of 1:10 year low flow
 - **Kakwa R. basin**
 - 9,444,426 m³
 - 0.8% of mean annual flow and 1.3% of 1:10 year low flow
- Source: Alberta Energy Regulator

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Water sourcing

- **Surface water (rivers, streams, lakes)**
 - Producers normally divert fresh surface water during periods of high flow (spring freshet) and store the water in reservoirs for later use
 - Reduces stress on the watercourse during periods of decreased flow
 - Mitigates risks to operations from water shortages/licence restrictions
 - Targeted especially in early stages of development
 - As regulatory changes have reduced water diversion rates, industry has moved to larger sources
- **Groundwater wells**
 - More mature development

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Water sourcing cont'd

- **Borrow pits**

- Excavation from which clay material was removed to build access roads and well pads, converted for water storage (naturally clay lined - > hold water)
- Borrow pits constructed after 2019 require Water Act approval at time of construction to be used as water source in the future

- **Private dugouts**

- Landowner constructed, either for livestock/farm use or as oil & gas water source
- Dugouts constructed after 2019 require Water Act approval at time of construction to be used as water source for oil and gas.



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Water sourcing cont'd

- **Recycled produced water flowback**

- Peace area produced water and flowback can have higher levels of sulfur compounds ('sour')
- Sour water requires more complex and expensive water treatment process prior to reuse
- Often uneconomic, particularly when disposal is not a limitation
- Additional risk considerations for water handling
- Recycling infrastructure needed

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Water sourcing considerations

- **Water source selection depends on numerous factors**

- Availability
- Timing
- Quantity and quality of water required
- Water chemistry
- Distance to water source
- Stage of development
- Economic
- Environmental
- Stakeholder concerns



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Water licensing: TDIs vs term licences

- **TDIs**

- Do not have priority status
 - First to be suspended/cut off in low flows
- Short-term, temporary uses (up to 1 year)
- Approvals turned around quickly
- Greater flexibility but less reliable/certain
- If an operator has already applied for a TDI from the same location two times, the AER rejects the application -> must apply for a term licence
 - Even if small volume, and future operational needs not expected to be significant

- **Term licences**

- Have seniority-based priority (FITFIR)
- 10-year licences
- Applications (and renewals) are more involved and review time longer
- Difficult to get amended (e.g., if PoU is just outside appurtenance area)
- Most oil and gas licences contain a condition that the Director may amend the licence (e.g., in low flows)

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Mighty Peace basins – # of oil & gas licences (points of diversion) in 2023

- **Peace River basin**
 - 2,348 TDLs + 117 term licences
- **Smoky River basin**
 - 1,398 TDLs + 83 term licences
- **Wapiti River basin**
 - 695 TDLs + 18 term licences
- **Little Smoky River basin**
 - 187 TDLs + 24 term licences
- **Kakwa River basin**
 - 121 TDLs + 17 term licences

Source: Alberta Energy Regulator

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Water storage – fresh water reservoirs

- **Water is pumped from the source and transferred to storage until it is needed**
- **Fresh water reservoir**
 - Constructed by industry specifically for water storage -> guarantees water source
 - Larger-scale; no maximum size
 - Typically single-lined
 - Can be in-ground or above-grade (bermed)
 - Central to both the water source and well pads
 - Also collects precipitation



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Water storage cont'd



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Water storage cont'd

- C-rings/AWSS
 - Provide temporary storage on-site (up to 3 months) to allow continual fracking without delay
 - Also used if recycling produced water/flowback on-site



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Water conveyance

- **When water is needed, it is transferred from storage to well pad**
 - Trucking
 - 10 to 12-inch layflat hose (temporary surface pipeline)
 - Depends on distance/cost
- **Temporary layflat hose**
 - Transfer lengths can be much longer, but typical length is 15 to 20 km
 - Hoses often follow municipal roads in drainage ditches
 - Typical time to complete the water transfer is 6 to 18 days
 - Line is continuously monitored during pumping operations



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Water security

- **Water transfer and storage is a costly part of operations**
 - ~15 to 30% of well completions costs, second to hydraulic fracturing
 - Alternative water sources more costly due to additional steps (treatment), more robust storage and conveyance infrastructure required, and safety/environmental risks to be managed
- **Lack of water security is a business risk**
 - Operational disruptions
 - Growth constraints
 - Increased costs if alternative solutions are required; e.g., purchasing water from a third party, trucking longer distances from a more abundant source within the basin
- **To ensure water security, operators may:**
 - Consider groundwater sources -> less responsive than surface water to climate variability, less competition
 - Build fresh water reservoirs at outset of development -> enables timing of water withdrawals at times of higher availability, water security for drilling season

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Cooperative water management

- **Water Act** term licenses specify that water must be used by one user for a specific purpose at a specific location; i.e., appurtenance provisions
- If operational plans change, fresh water diverted under term license cannot be used outside the licensee's specified area of use or by another operator
 - Even if replenished at a later time
- If an operator is not permitted to use available fresh water in a storage reservoir, result is:
 - New water diversion from a water body
 - Often, construction of redundant water storage infrastructure
- Hinders industry's efficient use of fresh water resources and precludes the sharing of water infrastructure between operators
- CAPP is advocating for a mechanism to enable 're-diversion' of fresh water within a basin to optimize timing of fresh water withdrawals and support cooperative water management approaches

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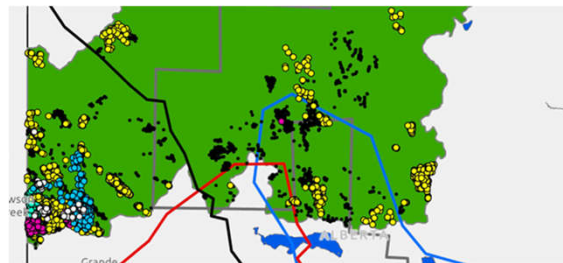
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Inter-basin water transfer

- Transfer of water across major river basin boundaries is not permitted under the *Water Act* except by a Special Act of the Legislature
 - Many energy companies have operations that straddle major basin boundaries
 - E.g., Duvernay play spans the boundary between the Peace/Slave and Athabasca river basins
 - Prohibition on inter-basin water transfers results in duplication of water hubs, reservoirs, and other infrastructure
 - CAPP is advocating for low-risk transfers of water to be enabled over short distances (i.e., less than 100 km) between adjacent major basin boundaries within Alberta
- Such transfers would be helpful where:
 - Water source in an adjacent basin is closer to the point of use than a water source in the same basin;
 - Water source in an adjacent basin is larger or less allocated



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Questions?

