

The governance of hydraulic fracturing in unconventional resources: the elements, form and effectiveness of the regulations

David Campin, PhD Candidate¹, Centre for Coal Seam Gas

Aspects of hydraulic fracturing

Hydraulic fracturing is a process used globally in energy recovery operations to increase fluid conductivity in the rock matrix. It has been used in the oil and gas sector since the late 1940's and also in CSG activities in Queensland to a small extent (<10% of wells) since the early 2000's. In combination with horizontal drilling and other advanced technologies it has dramatically altered the access to hydrocarbon reserves in very low permeability strata such as shales and tight sandstones. The US in particular has seen substantial increase in hydrocarbon recovery in the last 15 years. However, for various reasons, the term "fracking" has become associated with a social response to the rapid development of the sector across the globe. Governments have moved to regulate this aspect of the energy sector in response to the widespread application of this technology frequently in clear view of the public in a landscape previously utilised for agriculture or urban development.

Spectrum of regulation

The risks presented by hydraulic fracturing in an unconstrained, least-cost approach have widespread potential impacts to the environment: to surface water and groundwater, to the atmosphere, to the land, to ecosystems and people. The risks are not particular to the geographical setting but are ubiquitous across the globe². The degree of regulatory intervention³ is filtered through political processes reflecting a variety of drivers, hence, some risks may not be addressed by some governments for reasons not immediately apparent, resulting in the regulations having what could be perceived as obvious gaps.

The research question

This research seeks to inquire whether the form of regulation constraining hydraulic fracturing, that is whether it is prescriptive or performance based, is related to the maturity of petroleum development in the particular jurisdiction where unconventional resources are being accessed with hydraulic fracturing.

Jurisdictions from across the globe

Jurisdictions under consideration include:

- USA - Pennsylvania, Wyoming, Illinois, Colorado
- Canada – Alberta, British Columbia
- Australia – Western Australia, South Australia New South Wales, Queensland
- South Africa
- Brazil

Methodology

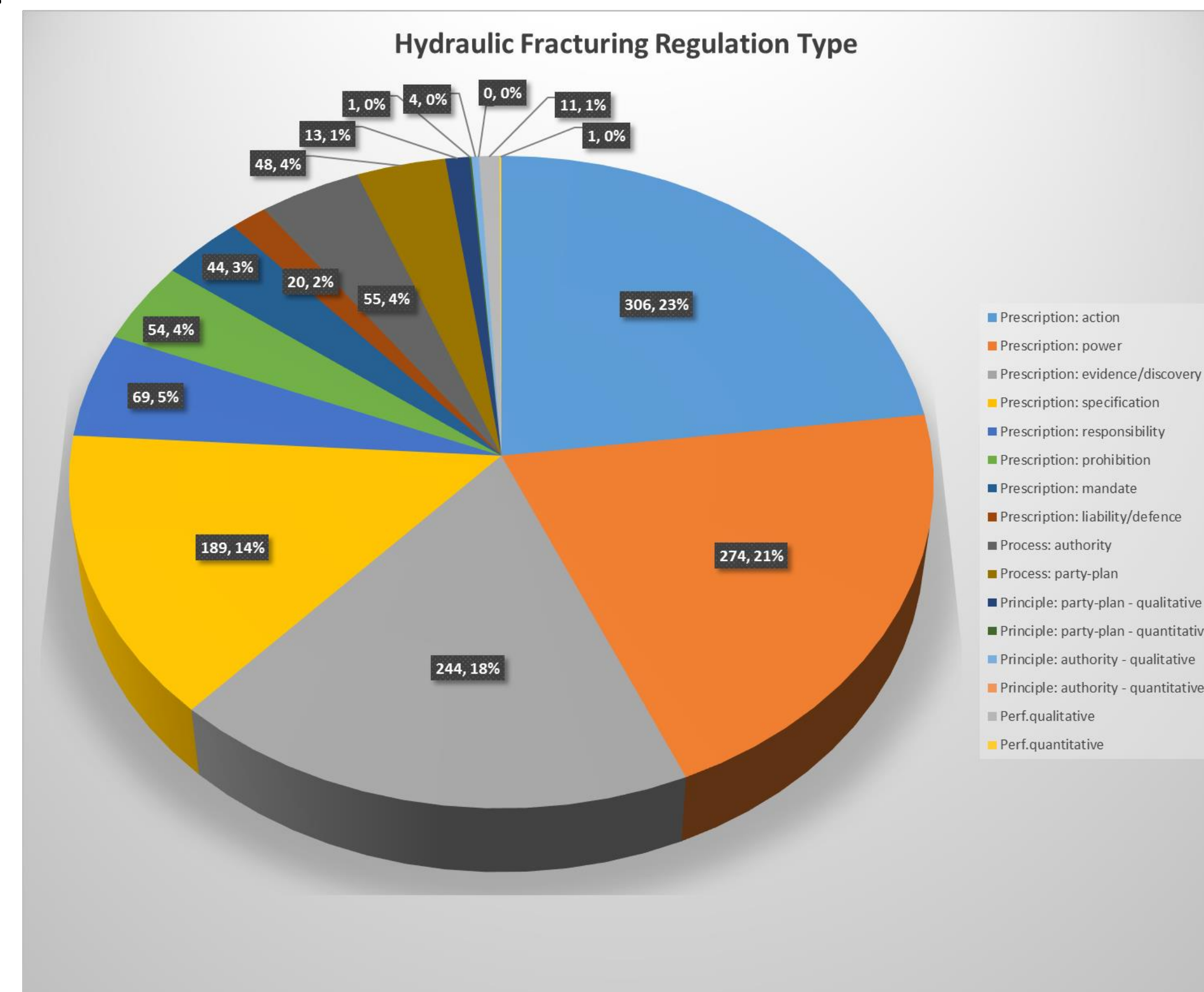
Regulations have been systematically 'deconstructed' using the *Institutional Grammar Tool*⁴ that allows for comparison of diverse legal constructs found across jurisdictions from the range of cultures and constitutional frameworks being considered. Each rule is assembled into a strict order allowing logical comparison and to determine the rule form, ie. prescriptive through to performance based.

Rule form

A typology of rules has been developed due to the absence of a precise categorisation in the literature. The spectrum identifies 8 types of **prescription**, 2 types of **process**-based rules, 4 types of **principle**-based rules and 2 types of **performance**-based rules.

Results

To date, some 1350 rules have been deconstructed and categorised. Overwhelmingly, jurisdictions use prescription or process (very similar to prescription) and the use of performance-type rules have been used in only **2%** of regulatory opportunities.



What is the value and where does it go

- The application of the *Institutional Grammar Tool* to deconstruct hydraulic fracturing legislation from multiple jurisdictions has demonstrated its utility and its ability to uncover anomalies, omissions and errors in rule construct.
- Broader than just hydraulic fracturing, the methodology clearly has very wide application in the framing of rules, regardless of the issue.
- The rule typology also has distinct value in allowing regulators or politicians to unequivocally develop rules that have the precise outcome sought, rather than an alternative.
- The methodology can be adopted by regulators to verify that their Intent is actually being put into effect rather than having a particular regulatory form being smothered by peripheral rules of a different nature.

A rarity: a performance-qualitative rule from South Africa
Intermediate casing for exploration and production wells must be set to protect unexpected fresh water found below the surface casing shoe.

1. Advisors: Prof Jim Underschultz, Chair of Petroleum Hydrodynamics, CCSG, UQ; Prof Andrew Garnett, Director, UQ Centre for CSG; Prof Tina Hunter, Director, Centre for Energy Law, University of Aberdeen; Prof Jonathan Fulcher, Director, CIMEL/IMELP, UQ; Dr Vlado Vivoda, Centre for Social Responsibility in Mining, UQ

2. DN Campin, *Is there scientific evidence to support the selection of hydraulic fracturing rules?* SPE 179353 (presented Society Of Petroleum Engineers, Health, Safety, Security, Environment, & Social Responsibility Conference, Stavanger, Norway, April 2016)

3. DN Campin, *Regulating hydraulic fracturing*, chapter in *Handbook of shale gas law and policy*, 2016 (ed Tina Hunter, intersentia, Cambridge, UK)

4. DN Campin, *Gaining Understanding into the Effectiveness of Hydraulic Fracturing Regulation*, presented at Energy Transitions Conference, University of Eastern Finland Law School, Joensuu, Finland, March 2016