

# UNEP Digital Discovery

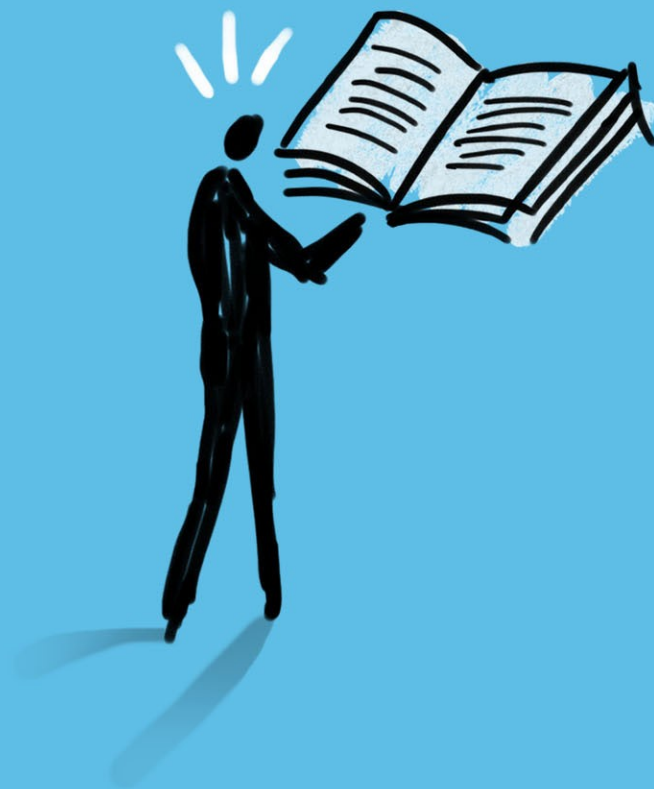
## Case Study: Data Visualization Initiative at the Canada Energy Regulator

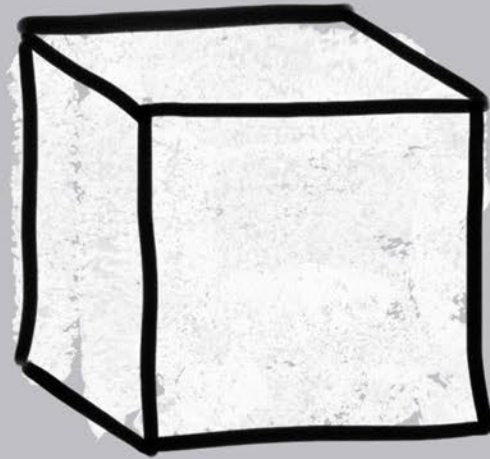
Annette Hester and Jagoda Walny

[www.thehesterview.com](http://www.thehesterview.com) and [research.jagoda.ca](http://research.jagoda.ca)

**This story is from the  
Canada Energy Regulator...  
but it could be about any  
organization.**

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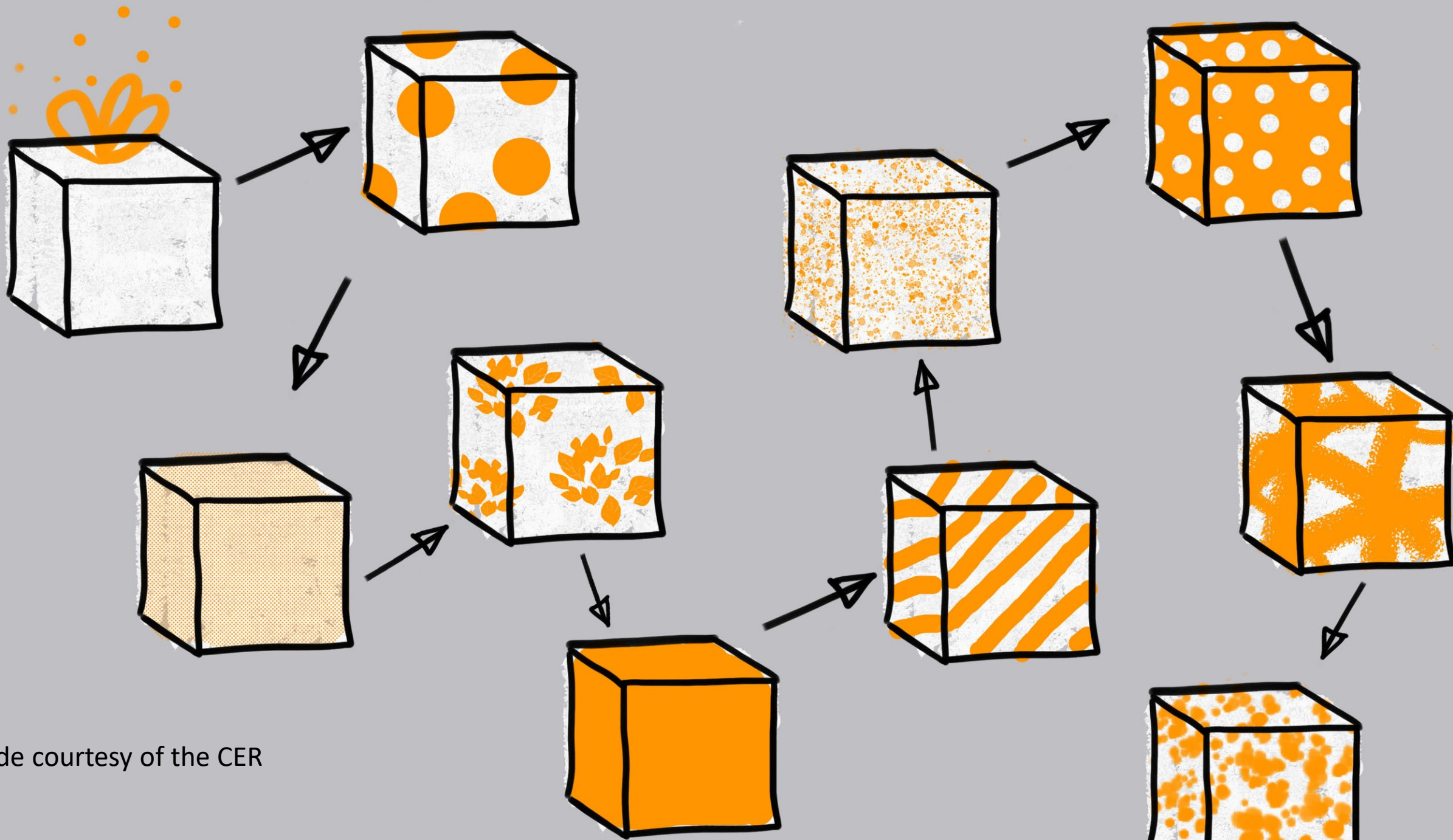


Data Unit

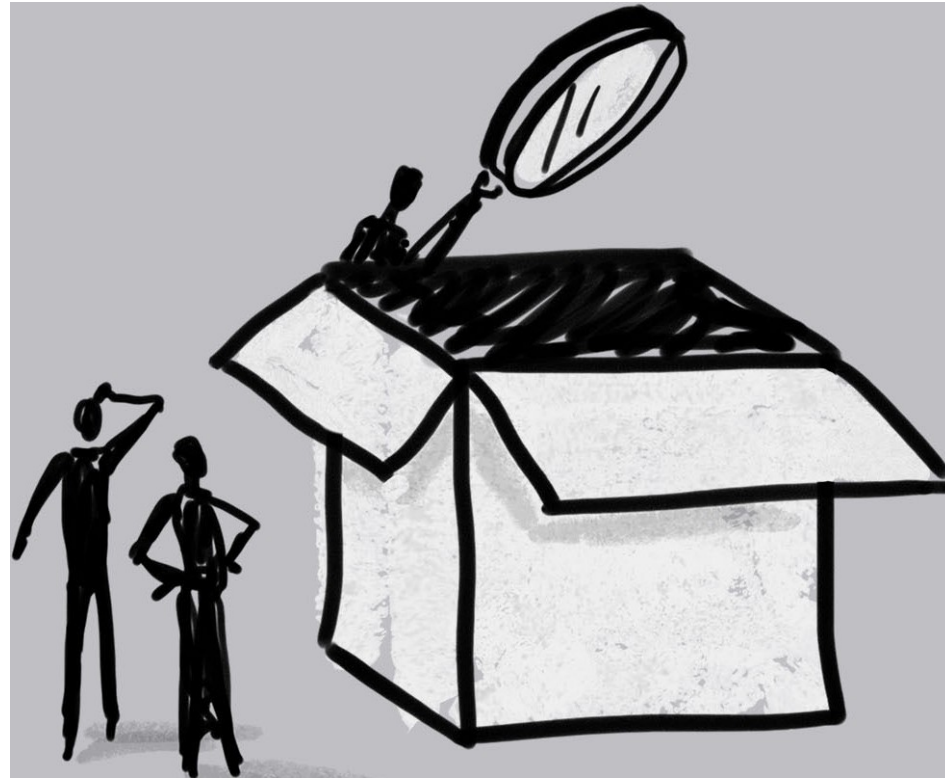


NEW Data Unit

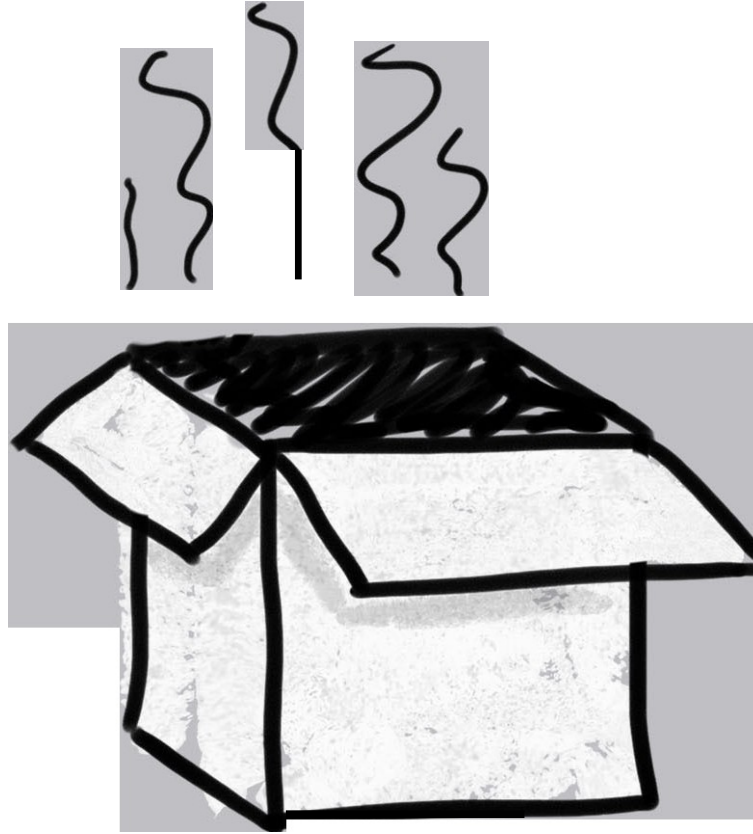
Slide courtesy of the CER



Slide courtesy of the CER



Eventually, instead of data **analytics**, we did **reporting**.



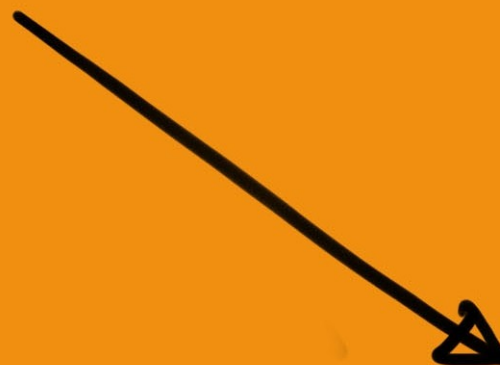
Reporting highlighted the poor quality of data.

Slide courtesy of the CER

"Your baby is ugly."



**A standard approach  
was not enough.**



, 0

,



**How do you introduce disruption  
without destruction?**





**A catalyst was needed  
to kick start the change.**

REPORT 

2019

2018

2017

2016\*

2016



in

**f**



## SCENARIOS

EVOLVING

## REFERENCE

②

TOTAL  
DEMANDELECTRICITY  
GENERATIONOIL  
PRODUCTION

	GAS PRODUCTION
--	----------------

UNIT 

GW.h

PJ

Mboe/d

YT  
\*\*\*

SK

QC

PE

ON

ALL



NB  
...



AB  
...

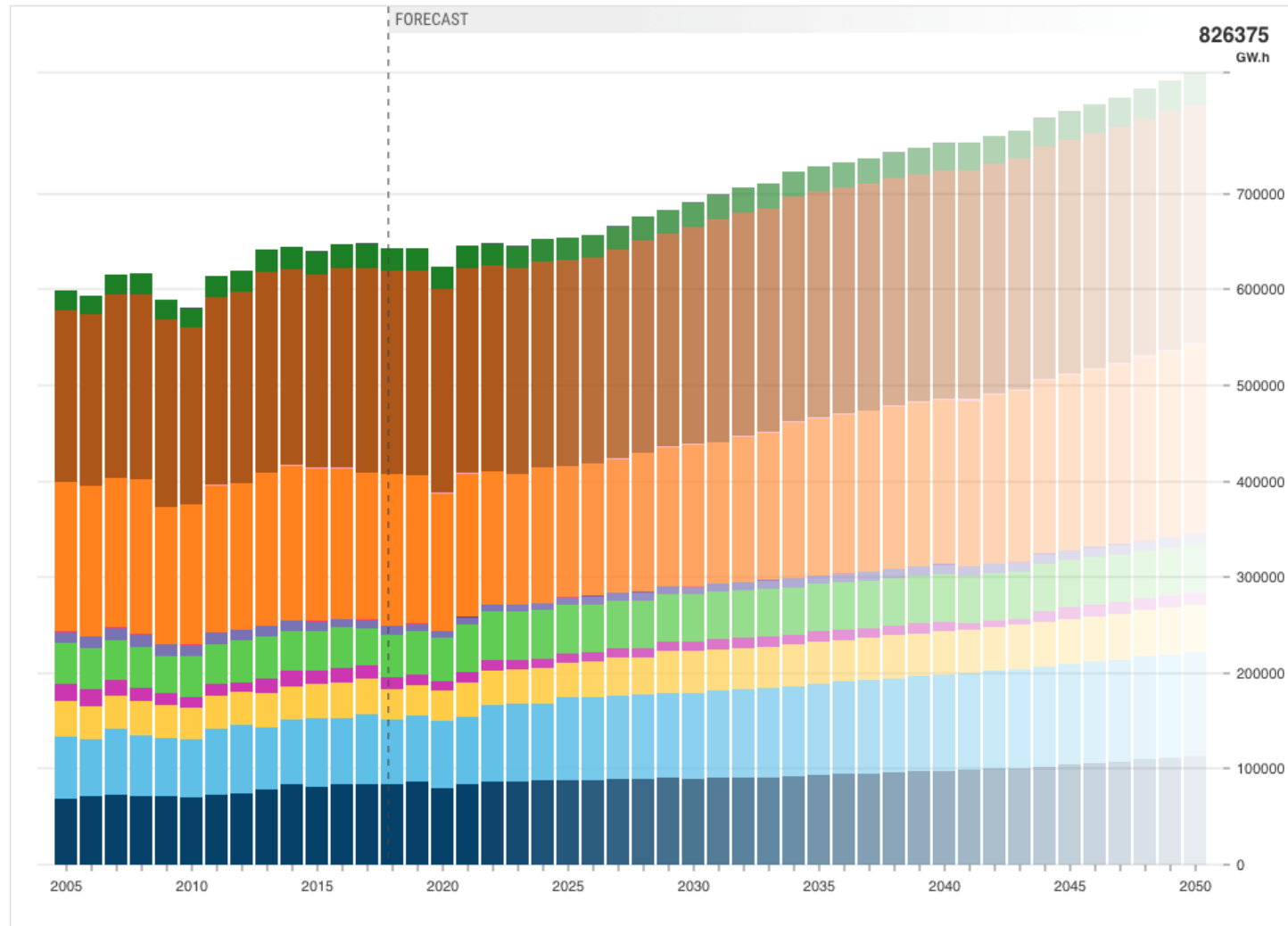
## CONTEXT

EF2020 Report

## Methodology

About

FORECAST



# Why data visualization?







SIMULTANEOUS  
PROCESSING



SEQUENTIAL  
PROCESSING



Thirty minutes passed one o'clock.

# WHAT PEOPLE RETAIN

**65%**

OF WHAT THEY  
**SEE**

**25%**

OF WHAT THEY  
**READ**

**10%**

OF WHAT THEY  
**HEAR**



Photo by [Ryan Ancill](#) on [Unsplash](#)



Photo by [Med Badr Chemmaoui](#) on [Unsplash](#)

**Why should data be any  
different?**



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Incident Types	Reported Date	Nearest Population	Province	Company	Status	Latitude	Longitude	Approximate Volume	Substance	Release Type	Significance	Year	What Happened	Who Was Affected
2	Release of Substance	1/2/2008	Grande Prairie	Alberta	Alliance Pipeline Ltd.	Closed	54.84	-118.65	Not Provided	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Major
3	Release of Substance	1/2/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed	49.73135	-101.23557	8	Crude Oil - Sweet	Liquid	No	2008	Corrosion and Cracking	Major
4	Release of Substance	1/23/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed	49.73135	-101.23557	100	Crude Oil - Sweet	Liquid	No	2008	Equipment Failure	Major
5	Release of Substance	1/29/2008	Fort Nelson	British Columbia	Westcoast Energy Inc., Canada	Closed	58.012	-122.694333	Not Provided	Natural Gas - Sweet	Gas	No	2008	Defect and Deterioration	Major
6	Release of Substance, Adverse	1/29/2008	Taylor	British Columbia	Westcoast Energy Inc., Canada	Closed	56.14377	-120.51605	Not Provided	Potassium Hydroxide	Miscellaneous	No	2008	Equipment Failure	Major
7	Release of Substance	2/23/2008	Beiseker	Alberta	Foothills Pipe Lines Ltd.	Closed	51.385029	-113.535263	Not Provided	Natural Gas - Sweet	Gas	No	2008	Defect and Deterioration	Major
8	Release of Substance	2/25/2008	Moosomin	Saskatchewan	TransCanada PipeLines Limited	Closed	50.20739	-101.48731	100	Natural Gas - Sweet	Gas	No	2008	Incorrect Operation	Station
9	Release of Substance	3/3/2008	Dryden	Ontario	TransCanada PipeLines Limited	Closed	49.7894	-92.76549	Not Provided	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Major
10	Release of Substance	3/3/2008	Smooth Rock Falls	Ontario	TransCanada PipeLines Limited	Closed	49.30391	-82.04386	18	Natural Gas - Sweet	Gas	No	2008	Equipment Failure	Major
11	Release of Substance	3/14/2008	Rapid City	Manitoba	TransCanada PipeLines Limited	Closed	50.07673	-99.99864	Not Provided	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Major
12	Fatality	3/24/2008	Kerrobert	Saskatchewan	Enbridge Pipelines Inc.	Closed	51.92095	-109.17023	Not Applicable	Not Applicable	Not Applicable	Yes	2008	External Interference	Inadequate
13	Release of Substance	4/1/2008	Haileybury	Ontario	TransCanada PipeLines Limited	Closed	47.44678	-79.76267	Not Provided	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Engine
14	Release of Substance	4/18/2008	Kenora	Ontario	TransCanada PipeLines Limited	Closed	49.80823	-94.18954	Not Provided	Natural Gas - Sweet	Gas	No	2008	Defect and Deterioration	Human
15	Release of Substance	4/21/2008	Regina	Saskatchewan	Plains Marketing Canada, Inc.	Closed	50.48057	-104.56646	4	Crude Oil - Sweet	Liquid	No	2008	Equipment Failure	Major
16	Release of Substance	4/25/2008	Charlie Lake	British Columbia	Westcoast Energy Inc., Canada	Closed	56.27973	-120.96341	Not Provided	Natural Gas - Sour	Gas	No	2008	Defect and Deterioration	Failure
17	Release of Substance	4/25/2008	Chetwynd	British Columbia	Westcoast Energy Inc., Canada	Closed	55.33867	-121.87115	Not Provided	Natural Gas - Sour	Gas	No	2008	Equipment Failure	Major
18	Fire	5/1/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed	49.73115	-101.2355	Not Applicable	Not Applicable	Not Applicable	No	2008	External Interference	Major
19	Release of Substance	5/6/2008	Herschel	Saskatchewan	Enbridge Pipelines Inc.	Closed	51.63826	-108.3544	9.4	Crude Oil - Sweet	Liquid	No	2008	Defect and Deterioration	Station
20	Release of Substance	5/12/2008	Regina	Saskatchewan	Enbridge Pipelines Inc.	Closed	50.48386	-104.61447	7	Crude Oil - Sweet	Liquid	No	2008	Equipment Failure	Engine
21	Fire	5/21/2008	Emerson	Manitoba	TransCanada PipeLines Limited	Closed	49.00106	-97.05547	Not Applicable	Not Applicable	Not Applicable	No	2008	Equipment Failure	Major
22	Adverse Environmental Effect	5/31/2008	Fort St. John	British Columbia	Westcoast Energy Inc., Canada	Closed	56.47564	-120.37265	Not Applicable	Not Applicable	Not Applicable	No	2008	Equipment Failure	Major
23	Release of Substance	6/5/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed	53.5431	-113.35401	8	Crude Oil - Sweet	Liquid	No	2008	Equipment Failure	Major
24	Release of Substance	6/6/2008	Maple	Ontario	TransCanada PipeLines Limited	Closed	43.87378	-79.57985	270	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Station
25	Adverse Environmental Effect	6/9/2008	Not specified	New Brunswick	Emera Brunswick Pipeline	Closed	45.21594	-66.71029	Not Applicable	Not Applicable	Not Applicable	No	2008	Equipment Failure	Major
26	Release of Substance	6/12/2008	Portage La Prairie	Manitoba	TransCanada PipeLines Limited	Closed	49.91204	-98.51757	Not Provided	Natural Gas - Sweet	Gas	No	2008	Equipment Failure	Major
27	Fire	6/24/2008	Moyie	British Columbia	TransCanada PipeLines Limited	Closed	49.28795	-115.83383	Not Applicable	Not Applicable	Not Applicable	No	2008	External Interference	Station
28	Fatality	6/25/2008	Herschel	Saskatchewan	Enbridge Pipelines Inc.	Closed	51.63833	-108.35487	Not Applicable	Not Applicable	Not Applicable	Yes	2008	Incorrect Operation	Human
29	Release of Substance	7/6/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed	53.54745	-113.35577	40	Crude Oil - Synthetic	Liquid	No	2008	Incorrect Operation	Major
30	Release of Substance	7/17/2008	Moosomin	Saskatchewan	TransCanada PipeLines Limited	Closed	50.20731	-101.48747	Not Provided	Natural Gas - Sweet	Gas	No	2008	Defect and Deterioration	Human
31	Release of Substance	7/18/2008	Alameda	Saskatchewan	Alliance Pipeline Ltd.	Closed	49.31834	-102.28983	800	Natural Gas - Sweet	Gas	No	2008	Equipment Failure	Major
32	Release of Substance	7/23/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed	53.5416	-113.36454	2	Diesel Fuel	Liquid	No	2008	Equipment Failure	Station
33	Release of Substance	7/31/2008	Hearst	Ontario	TransCanada PipeLines Limited	Closed	49.79469	-85.85655	Not Provided	Natural Gas - Sweet	Gas	No	2008	Defect and Deterioration	Major
34	Release of Substance	8/8/2008	Herbert	Saskatchewan	Spectra Energy Empress Mainline	Closed	50.539202	-107.30766	0.5	Propane	Gas	No	2008	Equipment Failure	Major
35	Serious Injury (NEB or TSB)	8/15/2008	Valemount	British Columbia	Trans Mountain Pipeline	Closed	53.024796	-119.151198	Not Applicable	Not Applicable	Not Applicable	Yes	2008	Incorrect Operation	Human
36	Fire	8/26/2008	Not specified	Saskatchewan	Enbridge Pipelines Inc.	Closed	51.10223	-106.35299	Not Applicable	Not Applicable	Not Applicable	No	2008	External Interference	Major
37	Fire	9/4/2008	Not specified	Saskatchewan	Enbridge Pipelines Inc.	Closed	51.44373	-107.37839	Not Applicable	Not Applicable	Not Applicable	No	2008	Equipment Failure	Engine
38	Release of Substance	8/28/2008	Vermilion Bay	Ontario	TransCanada PipeLines Limited	Closed	49.85542	-93.36393	Not Provided	Natural Gas - Sweet	Gas	No	2008	Corrosion and Cracking	Station
39	Release of Substance	9/5/2008	Taylor	British Columbia	Westcoast Energy Inc., Canada	Closed	56.14631	-120.6692	0.1	Butane	Gas	No	2008	External Interference	Human



## U.S. GUN KILLINGS IN 2018

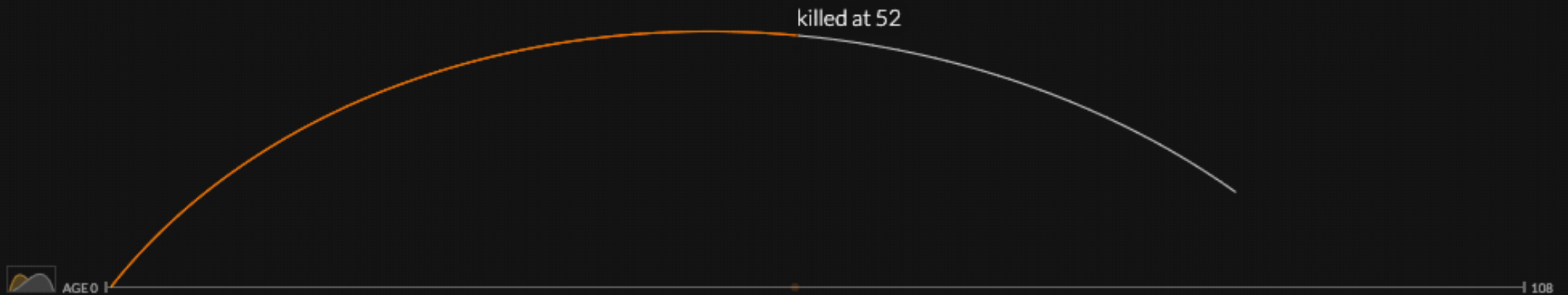
1

PEOPLE KILLED

JANUARY

0

STOLEN YEARS



# EXPLORING CANADA'S ENERGY FUTURE

REPORT <sup>?</sup> 2020 2019 2018 2017 2016\* 2016

 Download Data

## Electricity Generation By Region










SCENARIOS <sup>?</sup> EVOLVING REFERENCE

VIEW BY <sup>?</sup> REGION SOURCE

UNIT <sup>?</sup> GWh PJ Mboe/d

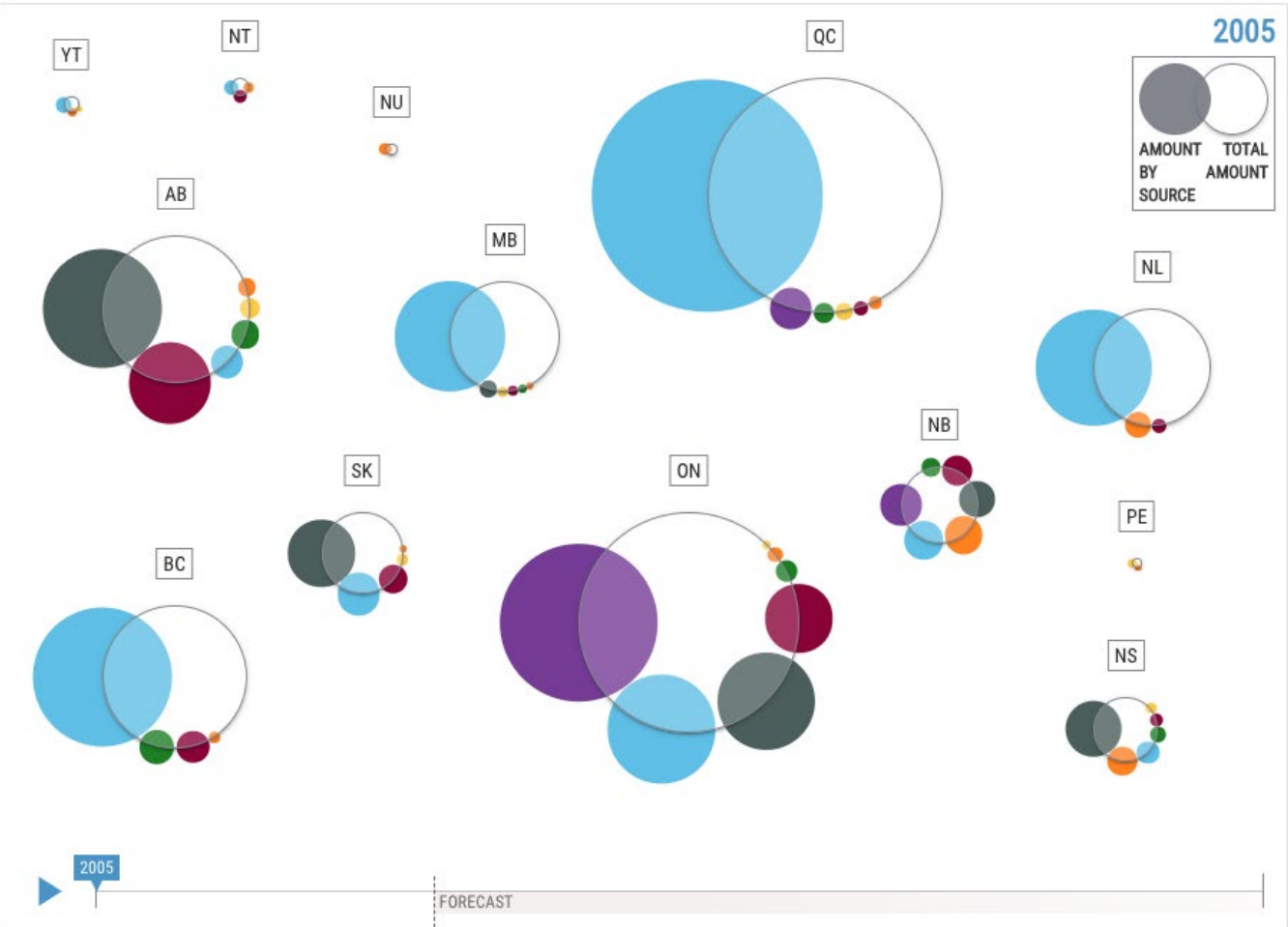
    

-  By Region
-  By Sector
-  Electricity
-  Scenarios
-  Oil and Gas

-        
-  ALL
- YT
- SK
- QC
- PE
- ON
- NU
- NT
- NS
- NL
- NB
- MB
- BC
- AB

### CONTEXT

- EF2020 Report
- Methodology
- About



**Show, don't tell.**



**\$3,500 billion US Federal budget**

A large, solid orange square with rounded corners, representing the US Federal budget. The text "\$3,500 billion US Federal budget" is written in white in the top-left corner of the square.



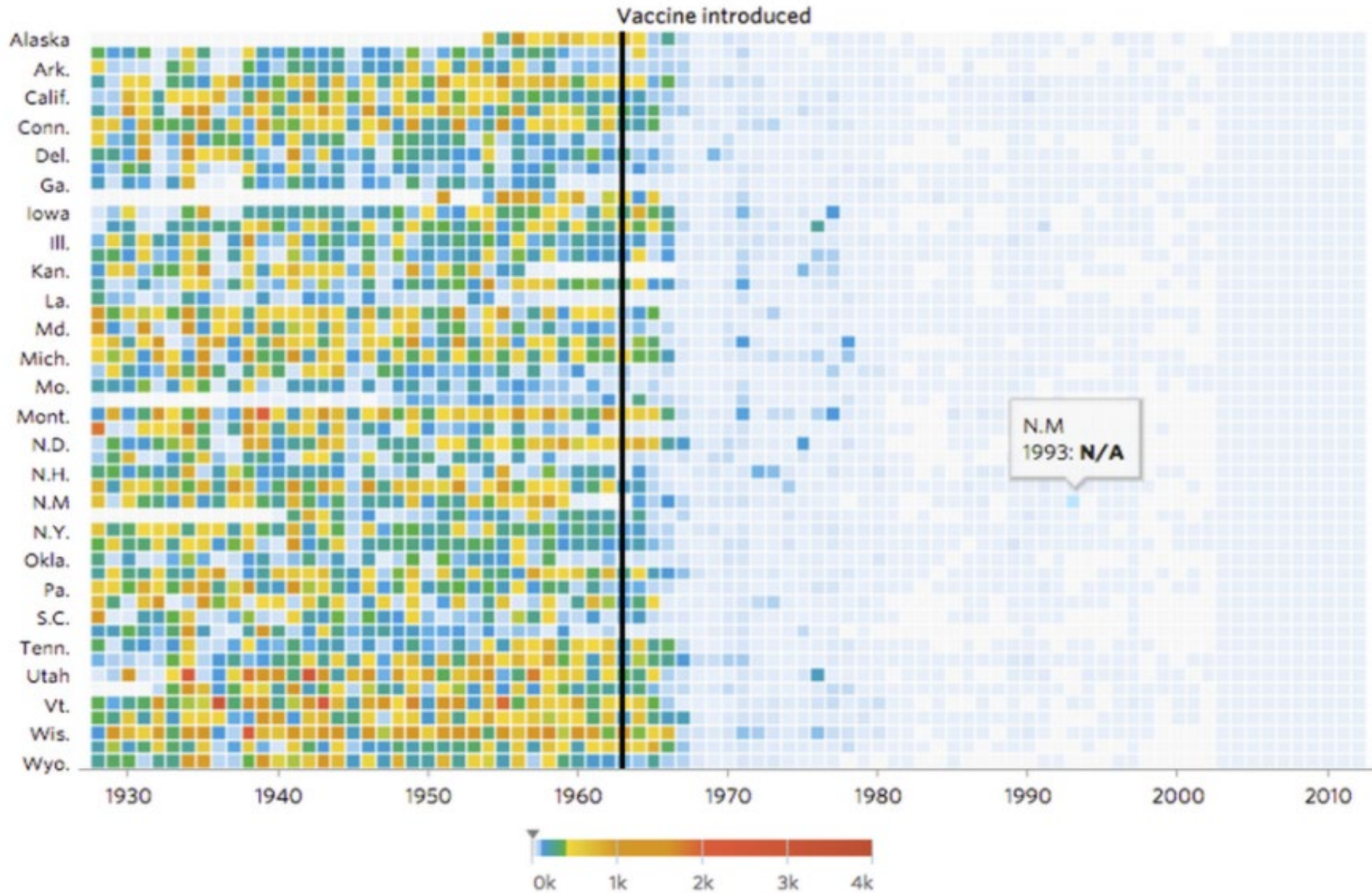
\$3,500 billion US Federal budget

- **\$100 million**  
budget cut

# Vaccines work

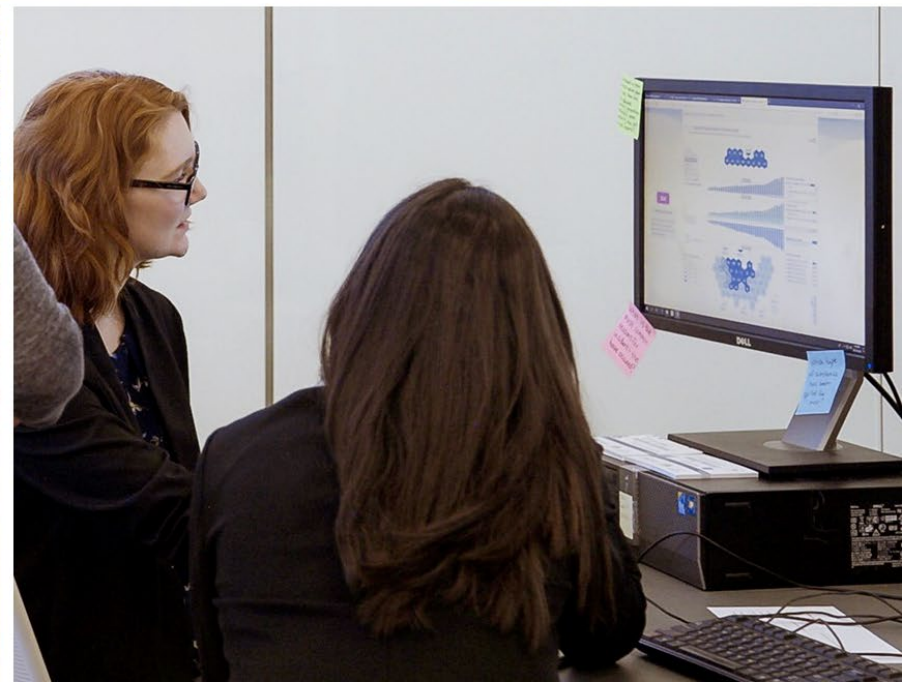


# Measles



**Accessible and available**





# Public datasets need design



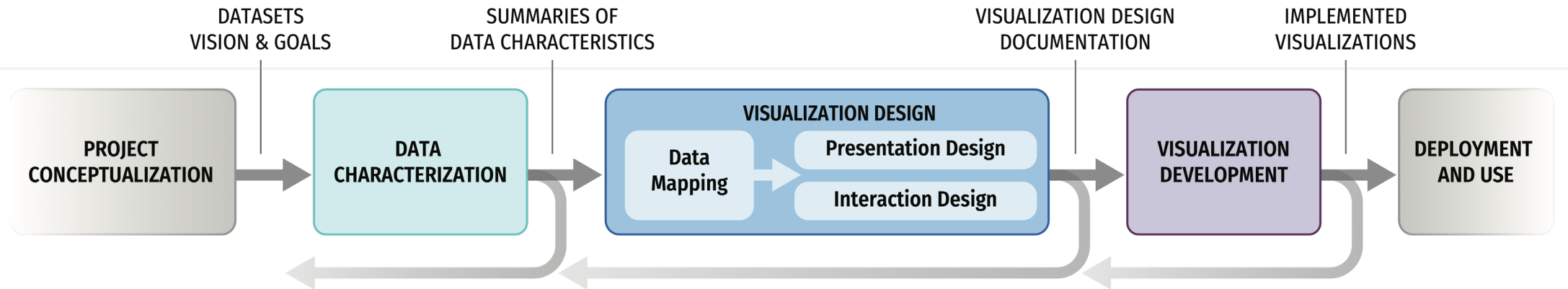


**Clear writing is a sign of clear  
thinking**

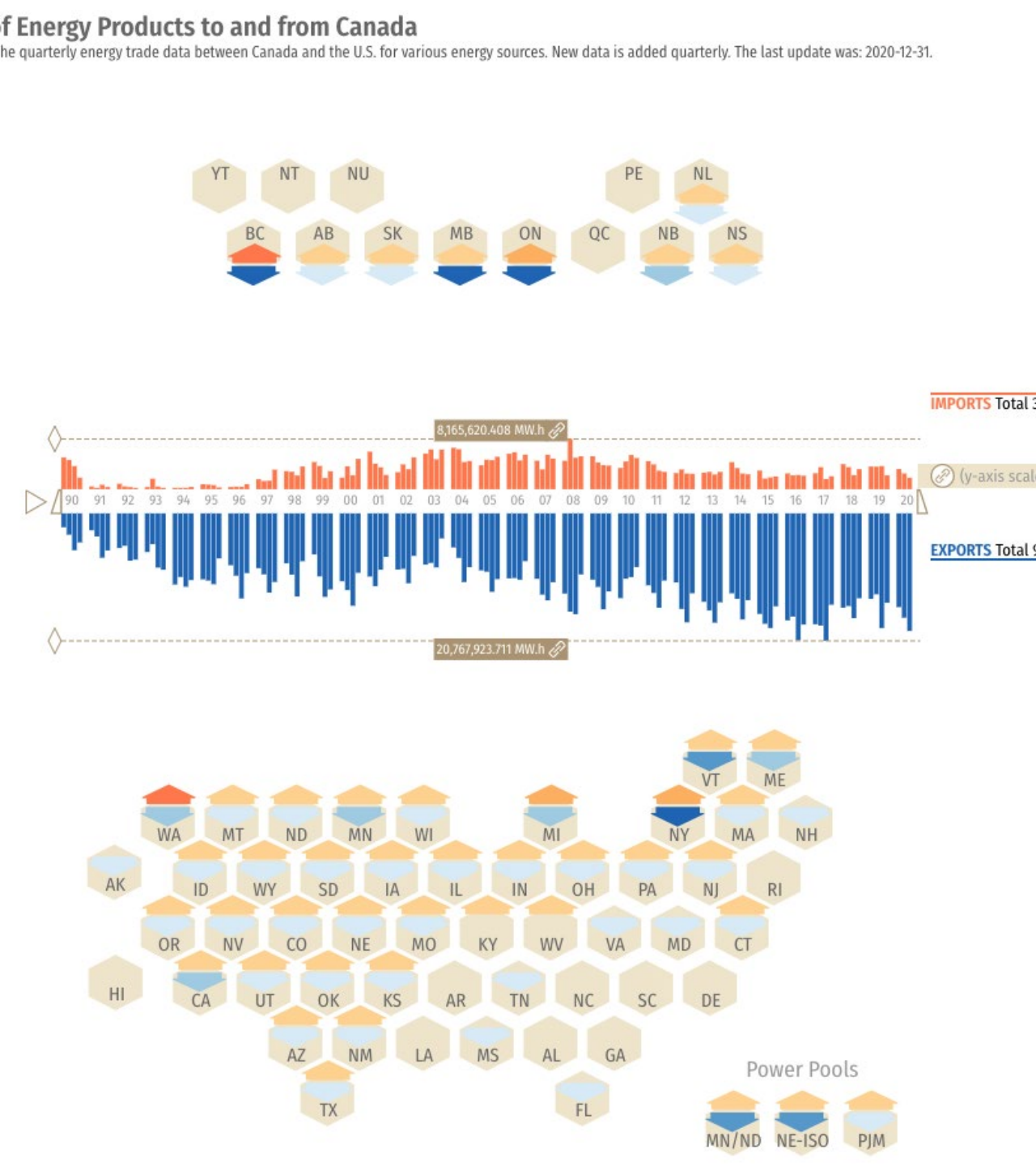


Artifacts

Project  
Phases



	B	C	D	E	F	G
1	Incident Types	Reported Date	Nearest Population	Province	Company	Status
2	Release of Substance	1/2/2008	Grande Prairie	Alberta	Alliance Pipeline Ltd.	Closed
3	Release of Substance	1/2/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed
4	Release of Substance	1/23/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed
5	Release of Substance	1/29/2008	Fort Nelson	British Columbia	Westcoast Energy Inc., Canada	Closed
6	Release of Substance, Adverse Environmental Effect	1/29/2008	Taylor	British Columbia	Westcoast Energy Inc., Canada	Closed
7	Release of Substance	2/23/2008	Beiseker	Alberta	Foothills Pipe Lines Ltd.	Closed
8	Release of Substance	2/25/2008	Moosomin	Saskatchewan	TransCanada PipeLines Limited	Closed
9	Release of Substance	3/3/2008	Dryden	Ontario	TransCanada PipeLines Limited	Closed
10	Release of Substance	3/3/2008	Smooth Rock Falls	Ontario	TransCanada PipeLines Limited	Closed
11	Release of Substance	3/14/2008	Rapid City	Manitoba	TransCanada PipeLines Limited	Closed
12	Fatality	3/24/2008	Kerrobert	Saskatchewan	Enbridge Pipelines Inc.	Closed
13	Release of Substance	4/1/2008	Haileybury	Ontario	TransCanada PipeLines Limited	Closed
14	Release of Substance	4/18/2008	Kenora	Ontario	TransCanada PipeLines Limited	Closed
15	Release of Substance	4/21/2008	Regina	Saskatchewan	Plains Marketing Canada, Inc.	Closed
16	Release of Substance	4/25/2008	Charlie Lake	British Columbia	Westcoast Energy Inc., Canada	Closed
17	Release of Substance	4/25/2008	Chetwynd	British Columbia	Westcoast Energy Inc., Canada	Closed
18	Fire	5/1/2008	Cromer	Manitoba	Enbridge Pipelines Inc.	Closed
19	Release of Substance	5/6/2008	Herschel	Saskatchewan	Enbridge Pipelines Inc.	Closed
20	Release of Substance	5/12/2008	Regina	Saskatchewan	Enbridge Pipelines Inc.	Closed
21	Fire	5/21/2008	Emerson	Manitoba	TransCanada PipeLines Limited	Closed
22	Adverse Environmental Effect	5/31/2008	Fort St. John	British Columbia	Westcoast Energy Inc., Canada	Closed
23	Release of Substance	6/5/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed
24	Release of Substance	6/6/2008	Maple	Ontario	TransCanada PipeLines Limited	Closed
25	Adverse Environmental Effect	6/9/2008	Not specified	New Brunswick	Emera Brunswick Pipeline	Closed
26	Release of Substance	6/12/2008	Portage La Prairie	Manitoba	TransCanada PipeLines Limited	Closed
27	Fire	6/24/2008	Moyie	British Columbia	TransCanada PipeLines Limited	Closed
28	Fatality	6/25/2008	Herschel	Saskatchewan	Enbridge Pipelines Inc.	Closed
29	Release of Substance	7/6/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed
30	Release of Substance	7/17/2008	Moosomin	Saskatchewan	TransCanada PipeLines Limited	Closed
31	Release of Substance	7/18/2008	Alameda	Saskatchewan	Alliance Pipeline Ltd.	Closed
32	Release of Substance	7/23/2008	Edmonton	Alberta	Enbridge Pipelines Inc.	Closed
33	Release of Substance	7/31/2008	Hearst	Ontario	TransCanada PipeLines Limited	Closed
34	Release of Substance	8/8/2008	Herbert	Saskatchewan	Spectra Energy Empress Mainline	Closed
35	Serious Injury (NEB or TSB)	8/15/2008	Valemount	British Columbia	Trans Mountain Pipeline	Closed
36	Fire	8/26/2008	Not specified	Saskatchewan	Enbridge Pipelines Inc.	Closed
37	Fire	9/4/2008	Not specified	Saskatchewan	Enbridge Pipelines Inc.	Closed
38	Release of Substance	8/28/2008	Vermilion Bay	Ontario	TransCanada PipeLines Limited	Closed
39	Release of Substance	9/5/2008	Taylor	British Columbia	Westcoast Energy Inc., Canada	Closed



# Data Visualization Initiative Objectives



Build Capacity.

Establish a Methodology.

Showcase the organization's data.

Ensure recognition of the organization as a leader in the field.

# Who was involved from outside?

## 3 MAJOR CONTRACTS



PROJECT LEAD



DESIGN + RESEARCH

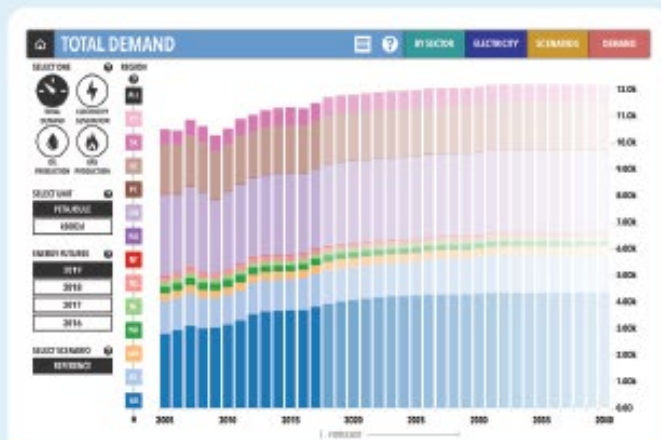


SOFTWARE DEVELOPMENT

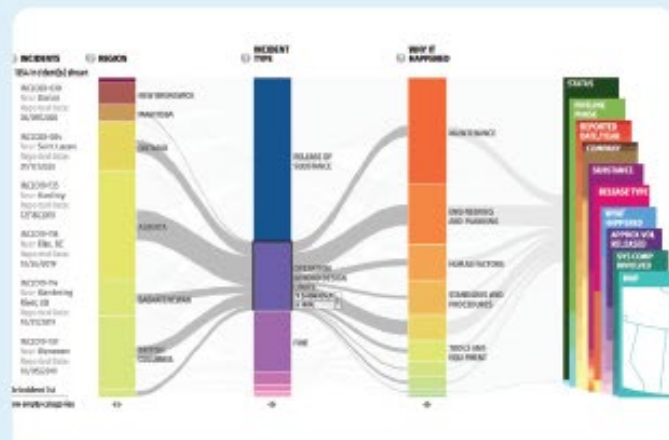
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## COLLABORATIONS WITH...

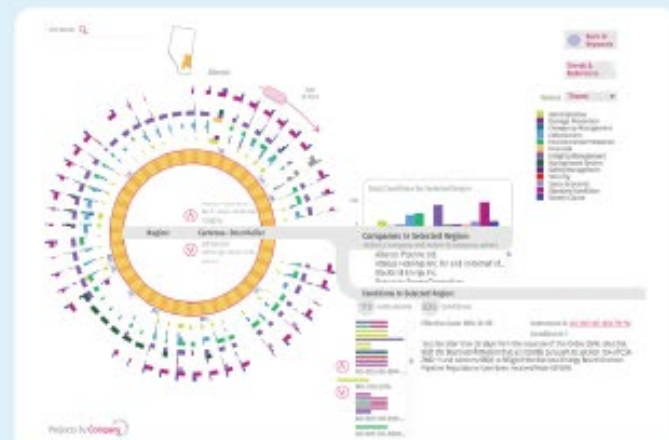




Pilot: Energy Futures Report Vis 1-4 Launch  
<https://www.cer-rec.gc.ca/energyfuturesdata>



Pipeline Incidents Vis Launch  
<https://www.cer-rec.gc.ca/pipelineincidents>



Conditions Vis Launch  
<https://www.cer-rec.gc.ca/conditions>

2016

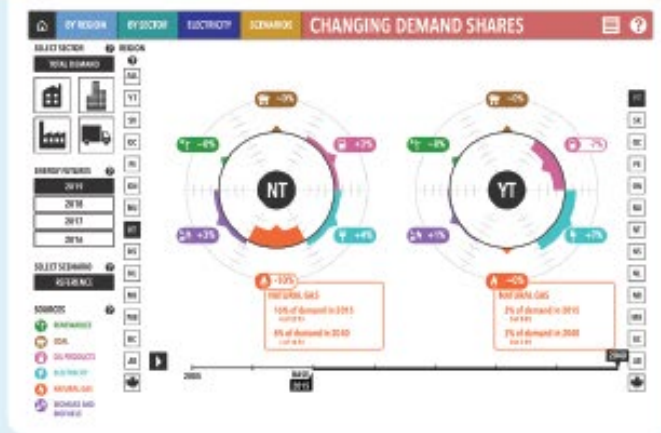
2017

2018

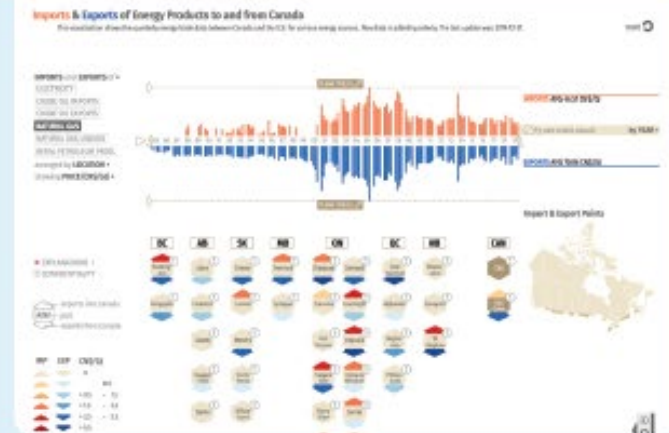
2019

2020

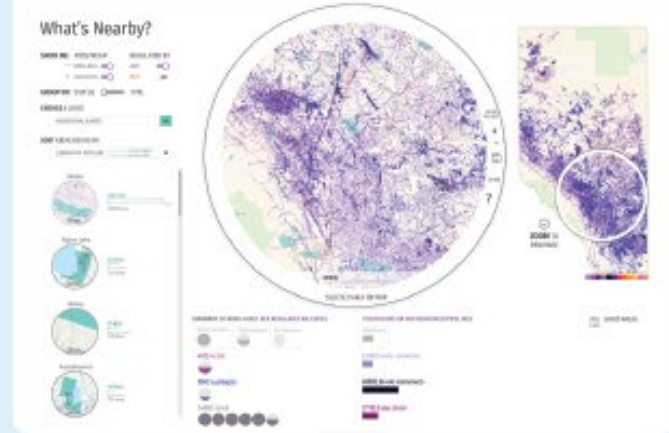
Energy Futures Vis 5 Launch  
<https://www.cer-rec.gc.ca/energyfuturesdata>




Import/Export Vis Launch  
<https://www.cer-rec.gc.ca/imports-exports>



Layered Assets Vis Design Complete



# Did the Project Deliver on the Objectives?




Build sustainable Capacity.

Establish a Methodology.

Showcase the organization's data.

Ensure recognition of the  
organization as a leader in the field.

# Unexpected Achievements

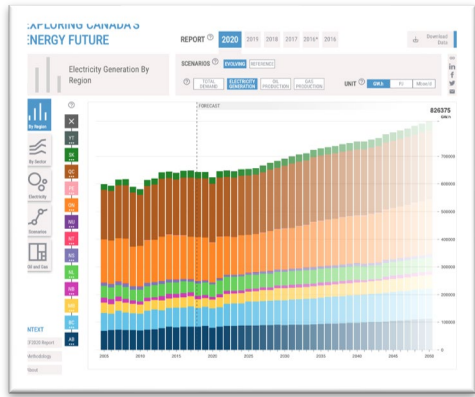


Overall support from management opened space for data innovation across the organization

In addition to producing datasets that supported business lines, BUs collaborated to produce datasets for communications and other uses.

Data warehouse created for DVI pipeline incidents is now used enterprise-wide

Creating educational outreach materials provided a significant new audience for CER data.



- *Canada's Energy Future* (report, pageviews, HTML) **80,980**
- *Canada's Energy Future* (report, downloads, PDF) **1,156**
- *Canada's Energy Future* (downloads of Excel data for figures) **513**
- *Canada's Energy Future 2016* (macro indicators database, pageviews, HTML) **20,447**
- *Exploring Canada's Energy Future* (data visualization, pageviews, HTML) **130,563**

CURATED  
INFORMATION

- *Exploring Canada's Energy Future* (data visualization, downloads from Government of Canada Open Government Portal, curated data, Excel) **301**
- *Exploring Canada's Energy Future* (data visualization, downloads of Methodology, Download Image and Download Data tabs) **1,089**

HIGH  
DATA SKILLS

LOW  
DATA SKILLS

EXPLORABLE  
DATA

#### SOURCE

<https://policyoptions.irpp.org/magazines/february-2019/data-visualization-government-can-empower-dialogue/>

**Has this story resonated so far?**



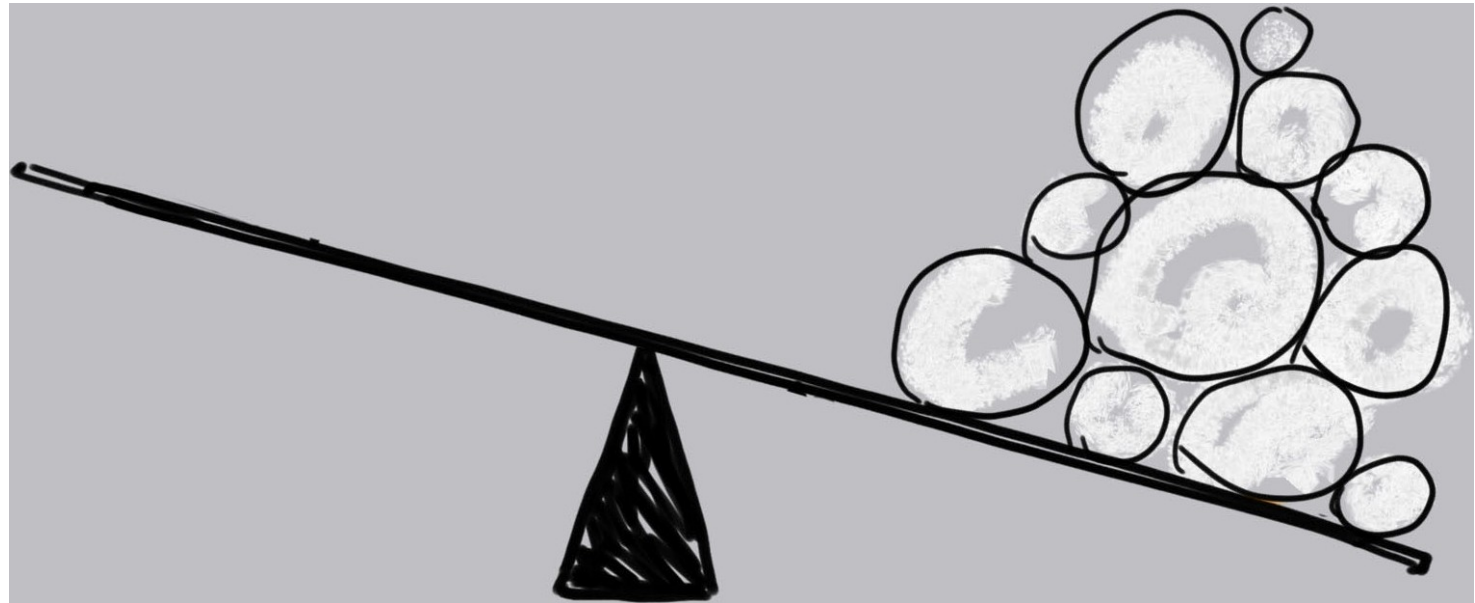
# Challenges?

Capacity building from the design and coding teams fell short as they had no counterparts in the organization.

Last visualization couldn't be completed because of lack of data

Ongoing risks to sustainability due to organizational changes, human resource allocation did not align with the DVI schedule

In spite of evidence of its engagement value, organization-wide adoption of the visualization tools is low

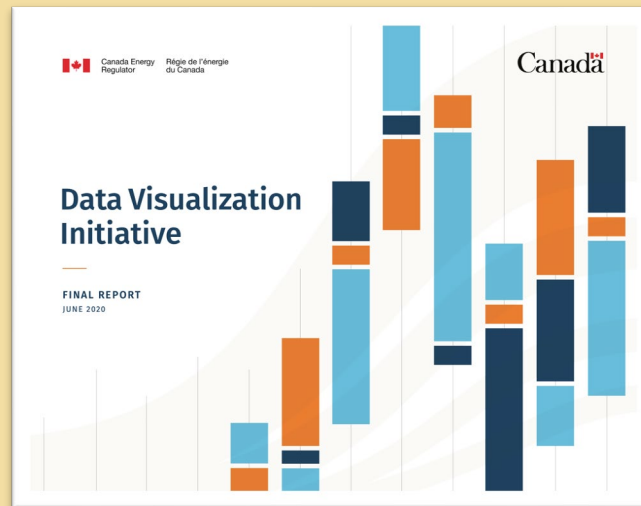


But there is still institutional resistance and status quo bias.



# There is no going back

<http://www.cer-rec.gc.ca/visualizedata>



**THANK YOU.**

<http://www.cer-rec.gc.ca/visualizedata>

<https://ilab.cpsc.ucalgary.ca/energyvis/>

[www.thehesterreview.com](http://www.thehesterreview.com)

