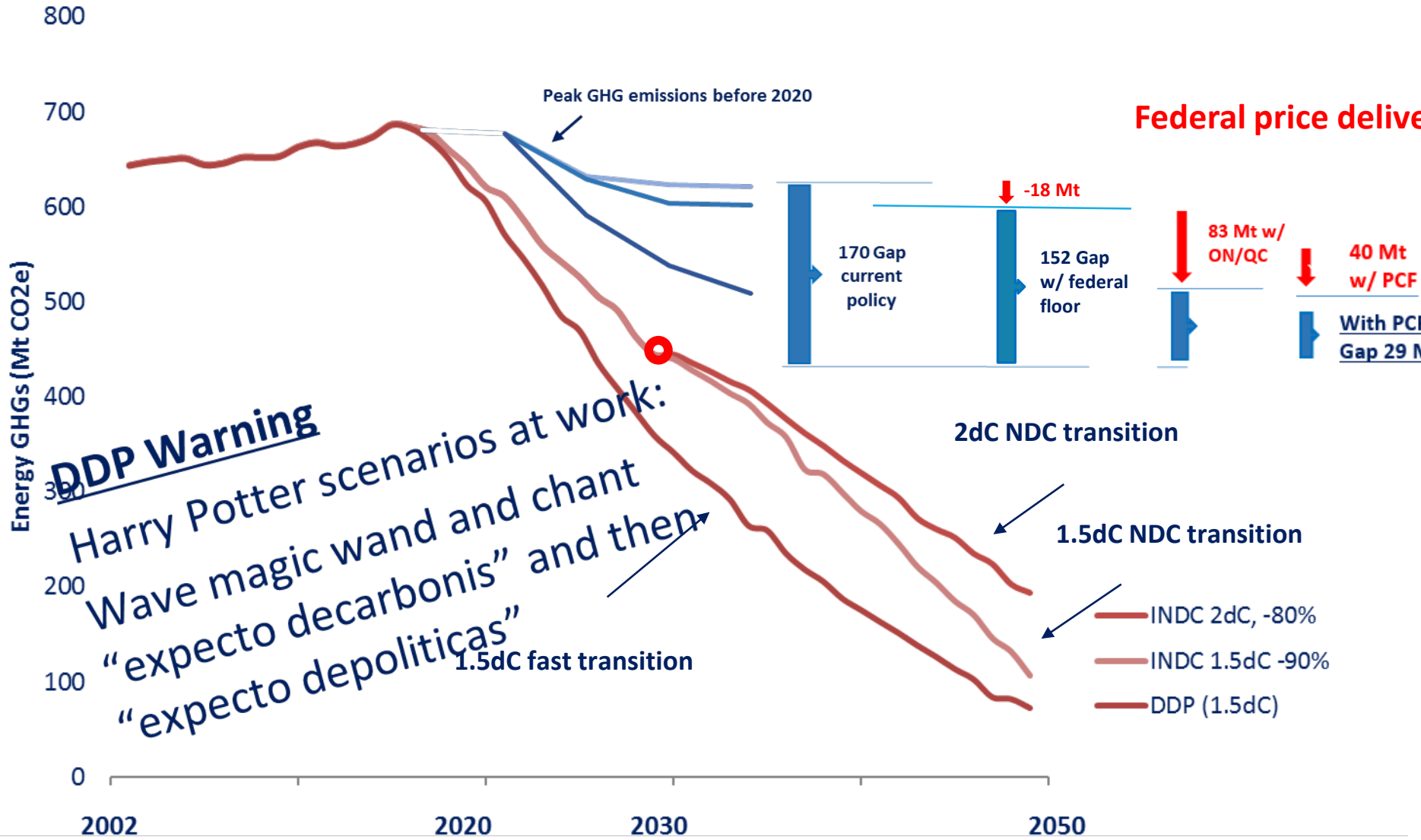
Awash in a Sea of Modelling Data

Thinking about data and modelling GHG action

Dave Sawyer, @enviroeconomics

Often with the help of @bataille_chris, Seton Stiebert and Jotham Peters


Energy GHGs (Mt CO2e)
800
700
600
500
400
300
200
100
0
2002
2020
2030
2050
Peak GHG emissions before 2020
170 Gap current policy
-18 Mt
152 Gap w/ federal floor
83 Mt w/ ON/QC
40 Mt w/ PCF
With PCF Gap 29 Mt
Federal price delivers 38 Mt by 2030
No ON C&T, Gap up 23 Mt
DDP Warning
Harry Potter scenarios at work:
Wave magic wand and chant
"expecto decarbonis" and then
"expecto depoliticas"
1.5dC fast transition
2dC NDC transition
1.5dC NDC transition
INDC 2dC, -80%
INDC 1.5dC -90%
DDP (1.5dC)

Energy and GHG Modelling: More demand and more political

Politically demanded

- Defend policy choices; use third-party to gain credibility.
- Briefing Ministers and cabinet routinely coast-to-coast.

Impact analysis across regions, sub-sectors, facilities, technology pathways and groups (rebates).

- PCF related assessments
  - Does the provincial policy meet the federal PCF benchmark?
  - EITE competitiveness review and OBPs outcomes;

Stoke take of progress and results

- Track and report results at home and abroad (UNFCCC global stock take)
- Retrospective review and policy evaluation

Modeling is routinely audited, “Under a microscope”.

- Reporting to parliament and public e.g. household rebates.

Costs and distributional impacts rise fast with decarbonization, policy patchwork

Ongoing data and analysis to assess and track,

Policy responses and interactions

Transitions and distributional impacts

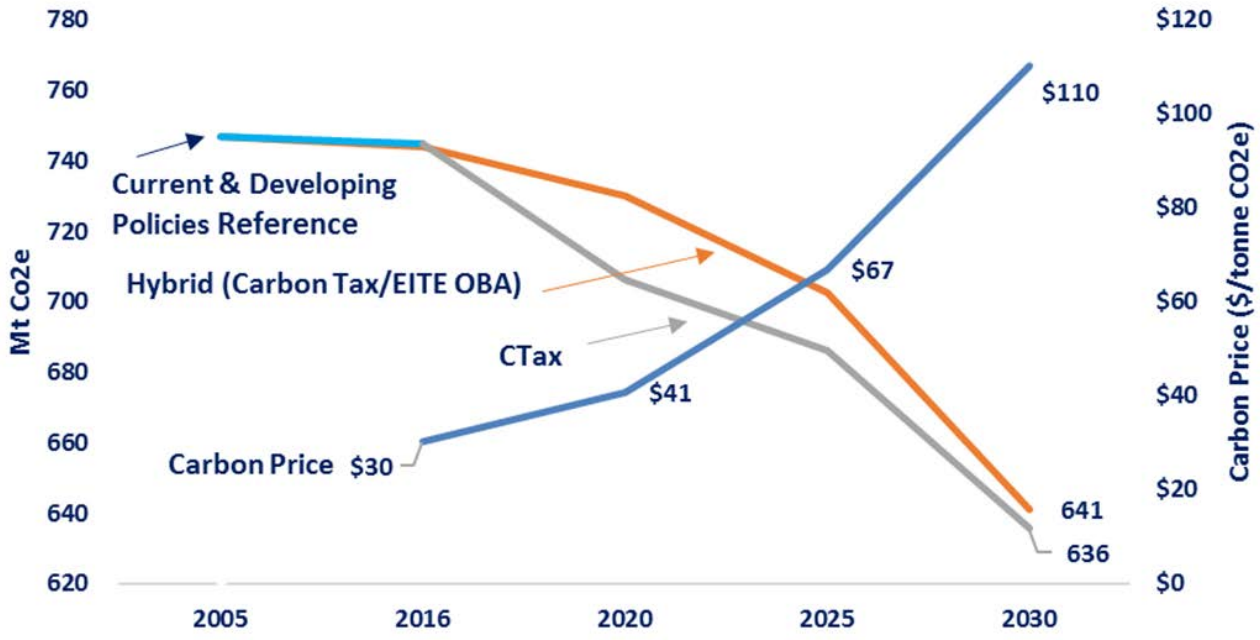
So many dimensions, complex.

Add high stakes, stretching realities

Cherry picking and poor analytics unavoidable

But, jumbled and piecemeal data leads to apple and orange comparisons, adding confusion.

So, **better data** and analysis **informs better policy development**.



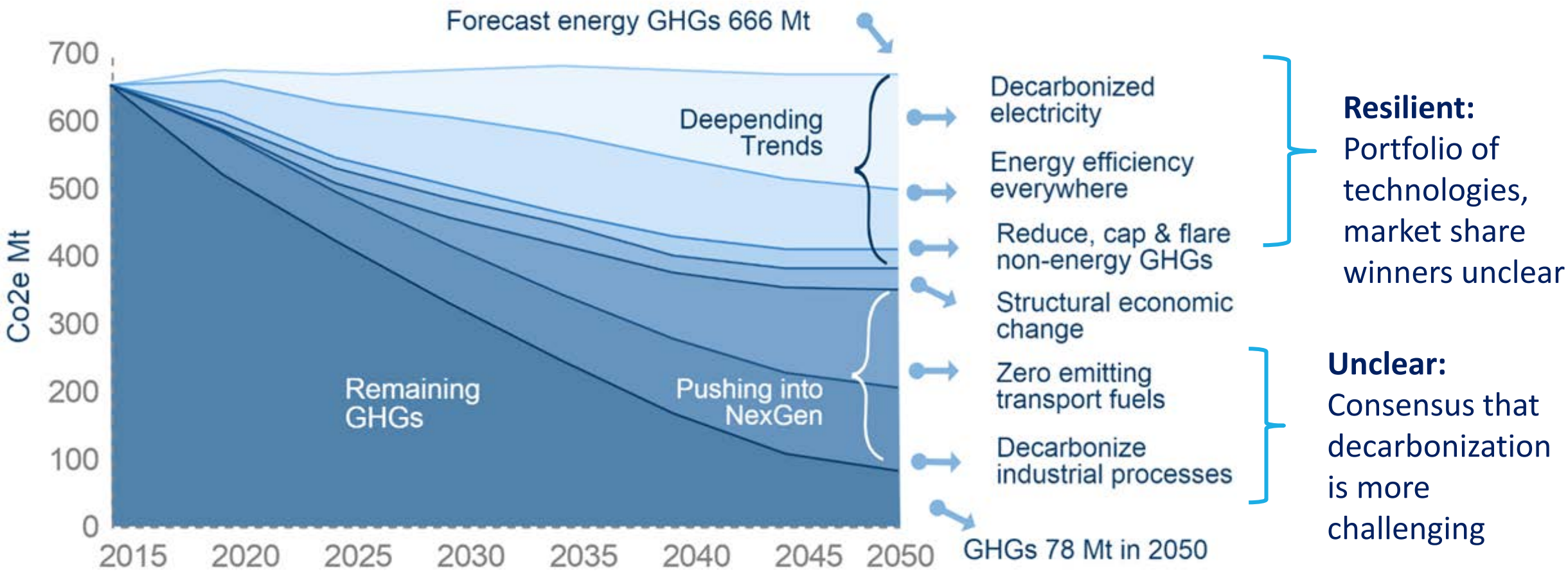
Sawyer, Dave and Chris Bataille, 2016. Canadian Carbon Pricing Pathways.

Analytical chain is complex, data rich and like spaghetti…

Some key priority areas and uncertainties

- Technology specification
- GHG intensity
- Policy packages
- Calibrating with past decarbonization

Technology Uncertainty
(Deep Decarbonization Pathways Project)

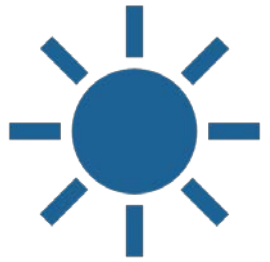


Resilient:
Portfolio of technologies, market share winners unclear

Unclear:
Consensus that decarbonization is more challenging

Short-comings:

Models do technology innovation badly



With sustained carbon policy, innovation signals likely will deliver more transformative technology

- Weak insight on EV and PV in 2009.
- Weak global policy and energy price.
- YET costs declines rapid.

How robust are the conclusions from the modeling?

Technology gaps

Technology gaps, especially with longer-term transformative technologies.

Hard to address emissions like commercial transport and industrial heat.

Technology bias (confirmation bias)

Assumptions in = conclusions out.

Usually models have limited backstop technologies

Nuclear, large hydro and CCS

If limited technology = limited advice on technology pathway.

Often need to make policy advice less technology prescriptive.

More focus on resilient policy learnings given technology uncertainties

GHG intensity uncertainty: Underpins so much analysis

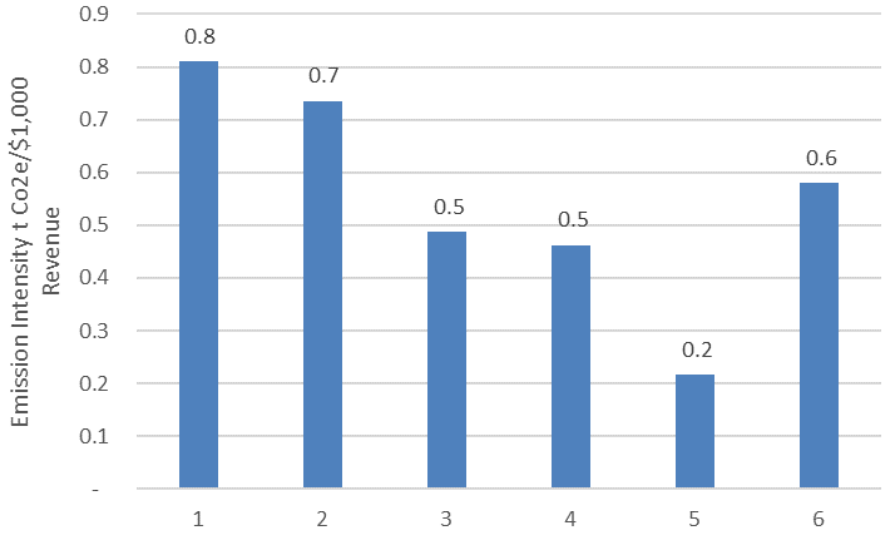
Build on the published emission intensity data, its helpful

- **Need 5-digit NAICS emission intensity**
  - Hard to scale sector economic data with GHGs
  - Federal output–based pricing a good example
    - A product benchmark within a 5-digit sector
    - Diverse set of GHGs and production

Diverse EIs in a 5-Digit NAICS

Key input is activity level for industry, transport and buildings

- Need disaggregated activity level
- No common EI currency: dollars and units both needed
- Standardization needed, also comparisons



A need to add **policy packages and technology deployment enablers.**

Many GHG Policies in place now.

Need reference cases reflecting diverse set of policy already in play.

Past policy reduces the stock of future abatement, raising future costs.

Innovation driving down costs and improving efficiency.

At innovation inflection point in Canada;

Policy and spending will drive more innovation domestically.

Non-price deployment barriers.

Sometimes it is not the price.

Need to add non-price resistance in technology choice.

Carbon revenue impacts.

Proceeds recycling resulting in non-marginal changes.

Can you target revenue and capture economy-wide dynamics?

Kaya: Calibrated with past decarbonization, not just GHGs

With historical set of GHG, energy and economic data, identify drivers of GHG change

- Kaya identify decomposes total GHGs for impact of activity, energy productivity and GHG intensity
- Very different set of sectoral GHG drivers

Track policy impacts

Strengthen GHG projections

Decomposed drivers help modelers better assess projections against history.