GREEN GROWTH INDICATORS: HOW DOES CANADIAN AGRICULTURE STACK UP AGAINST OTHER OECD COUNTRIES

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Outline of presentation

• Background
  ➢ What is green growth and what does it imply in addressing the challenges facing agriculture?
  ➢ Policy and monitoring progress challenges

• Monitoring progress towards green growth in agriculture
  ➢ The OECD Green Growth Measurement Framework
  ➢ How does it apply to agriculture?
  ➢ What does the empirical evidence show?

• Key lessons – What work OECD is doing?
What is green growth and what does it imply in addressing the challenges facing agriculture?
What is green growth?

Green growth is the pursuit of economic growth and development, while preventing environmental degradation, biodiversity loss and un-sustainable natural resource use. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities.
The Green Growth Agenda: Key characteristics

• No necessary conflict between growth and environment in the long run
• Tool to achieve sustainable development
• Focus on fostering innovation, investment and competition that can give rise to new sources of economic growth
• Coherence of policies
Green growth is widespread as a goal...

- OECD – *Green Growth Strategy*
- UNEP – *Green to Grow*, focusing on a low carbon future
- FAO – *Greening the Economy through Agriculture*, focusing on food security
- World Bank – *Moving to a Green Growth Approach to Development*, focusing on poorer countries
- Many countries have embraced green growth (Korea, Denmark, etc.)
- Many companies are also developing green growth strategies
Green Growth in agriculture means ....

• providing enough food, feed, fibre and fuel for a growing population...

• ...with greater pressure on land, water, energy and biodiversity resources - and the impact of climate change...

• ...and the need to limit the harmful and enhance the beneficial environmental impacts and reduce waste in the food supply chain

➢ So **productivity** has to rise faster than population and income, while reducing environmental footprints – “sustainable intensification”...

➢ ... Increasing productivity in a sustainable manner – from R&D, innovation, to uptake all along the food supply chain, while addressing **social concerns**.
The policy challenge ...

Policies that mutually reinforce *green and growth* –

- Increasing productivity in a sustainable manner
  - Investing in knowledge generation - R&D, innovation
  - Investing in knowledge creation - training, advisory
  - Investing in knowledge transfer - extension services
  - Investment and trade

Policies specifically aimed at *greening growth*

- Market-based instruments
  - Agri-environmental payments, environmental taxes, etc.
- Non-market instruments
  - Regulation, voluntary agreements, technical assistance

❖ But a lot of green is not priced..
The monitoring progress challenge

You can’t manage what you don’t measure

• If governments are going to pursue policies designed to promote green growth, they need indicators that can:
  ➢ raise awareness
  ➢ measure progress
  ➢ identify potential opportunities and risks
Monitoring Progress Towards Green Growth in Agriculture
OECD Green Growth Measurement Framework - Four dimensions

• Is growth becoming greener?
  ➢ Low-carbon, resource-efficient economy:
    ✓ Indicators of environmental and resource productivity

• Is there a risk of future shock to Growth?
  ➢ Rising productivity is not enough: often, an absolute decline in environmental pressures is needed to keep the natural asset base intact
OECD Green Growth Measurement Framework - Four dimensions

• **How the environment affects people?**
  - Capturing the direct interaction between people and the environment: *indicators of environmental quality of life*

• **How “green” helps growth and employment?**
  - Economic opportunities from environmental considerations and *policy responses*. 
The monitoring progress challenge: four dimensions

<table>
<thead>
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<th>The environmental and resource productivity of the economy</th>
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<td>1</td>
<td>- Carbon and energy productivity</td>
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<td>- Resource productivity: materials, nutrients, water</td>
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<td>- Multi-factor productivity</td>
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|   | The natural asset base |   |
| 2 | - Renewable stocks: water, forest, fish resources     |   |
|   | - Non-renewable stocks: mineral resources             |   |
|   | - Biodiversity and ecosystems                         |   |

|   | The environmental dimension of quality of life       |   |
| 3 | - Environmental health and risks                      |   |
|   | - Environmental services and amenities                |   |

|   | Economic opportunities and policy responses          |   |
| 4 | - Technology and innovation                          |   |
|   | - Environmental goods and services                   |   |
|   | - International financial flows                      |   |
|   | - Prices and transfers                               |   |
|   | - Skills and training                                |   |
|   | - Regulations and management approaches              |   |

|   | Socio-economic context and characteristics of growth |   |
|   | - Economic growth and structure                      |   |
|   | - Productivity and trade                             |   |
|   | - Labour markets, education and income               |   |
|   | - Socio-demographic patterns                         |   |
Guiding criteria for the selection of green growth indicators for agriculture

- Capture the nexus between the environment and the economy
- Be measured and comparable across countries
- Reflect key global environmental issues
- Ease of communication
- Alignment with the OECD framework
- Use existing data
Environmental and resource productivity: What does the empirical evidence show?
Nitrogen balance per hectare, 2013-15
Nutrient surpluses declined relative to agricultural production ……

2003-15 % changes

Nitrogen

Agric. production growth (%) vs. N balance/ha (%)

Phosphorus

Agric. production growth (%) vs. Phosphorus balance/ha (%)
But in Canada nutrient surpluses increased relative to agricultural land
Evolution of livestock composition and crop mix

- Cattle heads/Total livestock heads
- Oil crops/Total harvested crops

Graph showing the evolution from 1992 to 2014.
Pesticide sales per unit of land much lower than the OECD average

Average annual pesticide sales per ha (2011-15)
Share of agricultural GHG emissions in total 2013-15
Progress with decoupling GHG emissions from production growth in several countries

The diagram illustrates the decoupling of carbon productivity growth in agriculture from agricultural production growth in 2003-15 for various countries. The y-axis represents carbon productivity growth in agriculture (%), while the x-axis shows agricultural production growth (%). The diagram is divided into three quadrants:

1. **Relative decoupling** is indicated by data points above the line, suggesting an increase in carbon productivity growth without a corresponding increase in agricultural production growth.
2. **Absolute decoupling** is represented by data points above the line and above the x-axis, indicating a decrease in both carbon productivity growth and agricultural production growth.
3. **No decoupling** is shown by data points below the line, indicating no change in either carbon productivity growth or agricultural production growth.

Countries such as EU15, OECD, and EU28 are marked on the diagram, illustrating their progress or lack thereof in decoupling GHG emissions from production growth.
Progress with decoupling GHG emissions from agricultural production

- **Canada agricultural GHGs emissions**
- **Canada GHGs emissions intensity**
- **OECD GHGs emissions intensity**

**Graph Details:**
- **Y-axis:** 1000 tonnes of CO₂
- **X-axis:** Years from 1990 to 2015
- **Legend:**
  - Blue bars: Canada agricultural GHGs emissions
  - Red solid line: Canada GHGs emissions intensity
  - Red dashed line: OECD GHGs emissions intensity

**Graph Description:**
- The graph shows the trend of GHG emissions from agriculture in Canada compared to the OECD average.
- Over the years, there is a visible decrease in the intensity of GHG emissions, indicating progress.
On-farm energy use comparable to OECD average, but is increasing...

Share of agriculture in total energy (%)
Energy productivity is declining...

![Graph showing declining energy productivity]

- Energy productivity is decreasing over the years from 1990 to 2016.
- The graph compares energy production and productivity, with energy production increasing while productivity decreases.
TFP growth in primary agriculture is comparable with OECD, but slowed down.
Natural asset base:
What does the empirical evidence show?
Land use change

Average annual % change 2005 to 2015
Farmland bird populations continue declining

Average annual % change in farmland bird index (2000=100)
Economic opportunities and policy responses: What does the empirical evidence show?
Evolution of agricultural policies in OECD countries

• Agricultural policy reform in OECD countries has been progressing slowly – but it is still a protected sector

• Some reduction in support and shift towards public goods (e.g. environment) and other objectives (e.g. rural development)

• Less emphasis on which commodities farmers can produce, but more restrictions on how they produce them
Producer support is half than the OECD average ...
But potentially most distorting support is similar to the OECD average

(% Share in producer support, 2015-17)
Producer support is without environmental constraints, 2015-17 (%)
Potentially environmentally harmful agricultural support decreased in OECD area

Potentially most environmentally harmful support
High share of Government expenditures on AIS in total support to agriculture
Public agricultural R&D intensity is the 6th largest

Budget allocations for agricultural sciences R&D as a percentage of agricultural value-added

Source: OECD R&D statistics and ASTI database.
Agri-food research co-operation outputs close to OECD average

Source: ECD patent statistics and Scimago.
Key lessons – what work OECD is doing?
Key lessons

• Canada has made progress towards green growth in agriculture, but there is a need for further progress:
  ➢ Nutrient balances
  ➢ GHG emissions
  ➢ Energy productivity
  ➢ Total factor productivity

• Evidence is partial:
  ➢ Gaps in data availability and quality
  ➢ Conceptual and methodological challenges
  ➢ Empirical evidence often confusing
What OECD is doing?

- Country reviews on innovation, productivity and sustainability
- Agri-environmental indicators
- Environmental impacts of agricultural policies
- OECD co-ordinated Network on Total Factor Productivity and the Environment
  - 4-5 April 2019
  - 30-31 October 2019
Thank you for listening!

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Green Growth framework

**Enabling conditions**
- Balanced tax structures
- R&D and innovation policy
- Competition
- Infrastructure investment
- Openness to trade and FDI

**Key policy tools**
- Pricing of pollution and resource use
- Subsidy reform
- Regulatory and policy predictability
- Support to basic research and emerging technologies
- Governance of natural assets

**Major environmental issues**
- Water scarcity
- Climate change
- Health impacts of pollution
- Biodiversity loss

**Promoting transition**
- Skills and labour market adjustment
- Distributional and competitiveness concerns
- Science and technology cooperation
- Development assistance
- Management of global public goods

**Measurement agenda**
- Productivity of resource use
- Physical evolution of the natural asset base
- Environmental quality of life
- Opportunities arising from environmental considerations
- Evolution of policy and social responses
- Promoting efforts consistent with international standards
Framework for green growth indicators

- **Natural asset base**
  - Amenities, health & safety aspects
  - Pollutants
  - Waste
  - Energy & raw materials
  - Water, land, biomass, air

- **Economic activities**
  - Consumption
    - Households
    - Governments
  - Investments
  - Outputs (Income, Goods & services, Residuals)
  - Production (Multi-factor productivity)
  - Inputs (Labour, Capital, Resources)

- **Service functions**
- **Sink functions**
- **Resource functions**

- **Policies, measures, opportunities**

Indicators monitoring:
- Environmental and resource productivity
- The natural asset base
- The environmental quality of life
- Economic opportunities and policy responses

For executive summary

Service functions

Consumption

Households
Governments

Investments

Energy & raw materials

Policies, measures, opportunities

Amenities, health & safety aspects

Pollutants

Waste

Energy & raw materials

Water, land, biomass, air

Multi-factor productivity

Natural asset base

1 2 3 4
Agri-environmental progress

Average annual change (2003-05 to 2013-15)

- Nitrogen balance
- Phosphorus balance
- Direct on-farm energy consumption
- Water use
- Greenhouse gas emissions

Canada
OECD

%
Beef: Limited progress with decoupling GHG emissions from production

![Graph showing emissions intensity and production over time]
Pigmeat: Progress with decoupling GHG emissions from production

- **Emissions intensity**
- **Emissions (CO2eq)**
- **Production**
Livestock accounts for more than half of GHG emissions (2016)

Source: FAOSTAT