



Government  
of Canada

Gouvernement  
du Canada

# Technology Demonstration and Performance Reporting

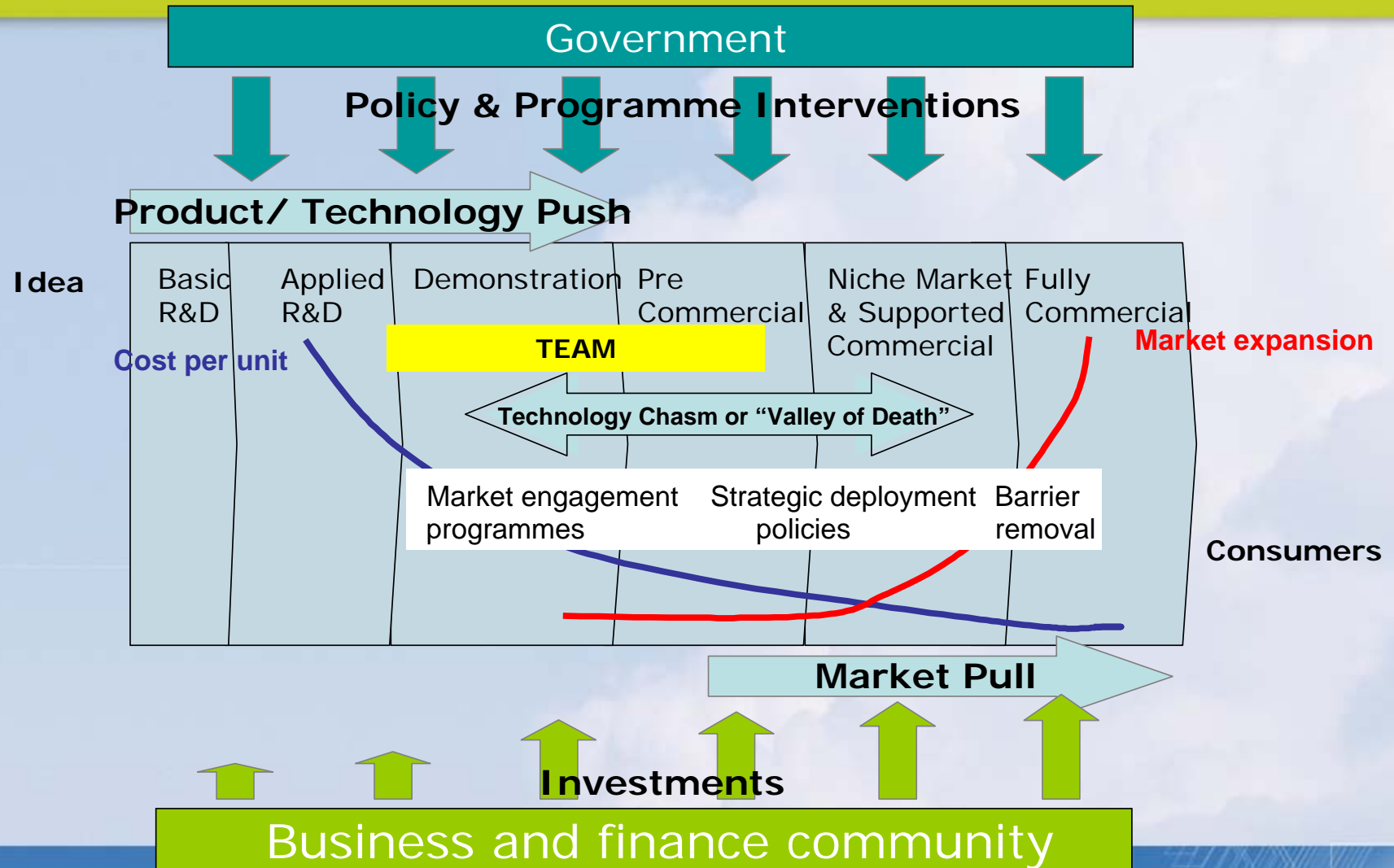
Presented by: **Wayne Richardson, Director  
TEAM Operations Office**

TEAM

TECHNOLOGY EARLY ACTION MEASURES  
MESURES D'ACTION PRÉCOCE EN MATIÈRE DE TECHNOLOGIE

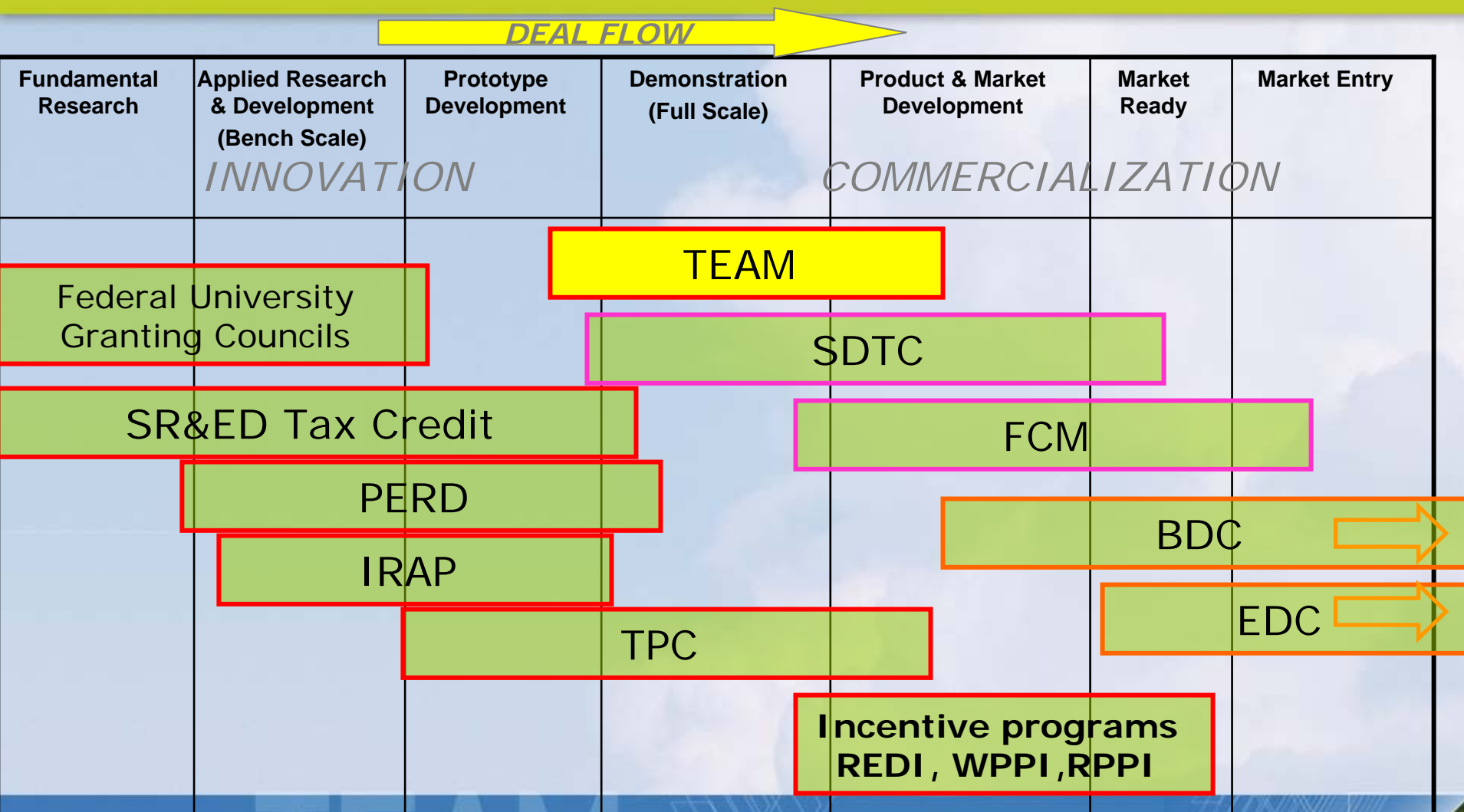
**2<sup>nd</sup> International ETV Forum  
Vancouver, Canada  
March 2006**

# The Innovation/Commercialization Process



# TECHNOLOGY INNOVATION COMMERCIALIZATION PROCESS

## Canadian Federal Funding Context

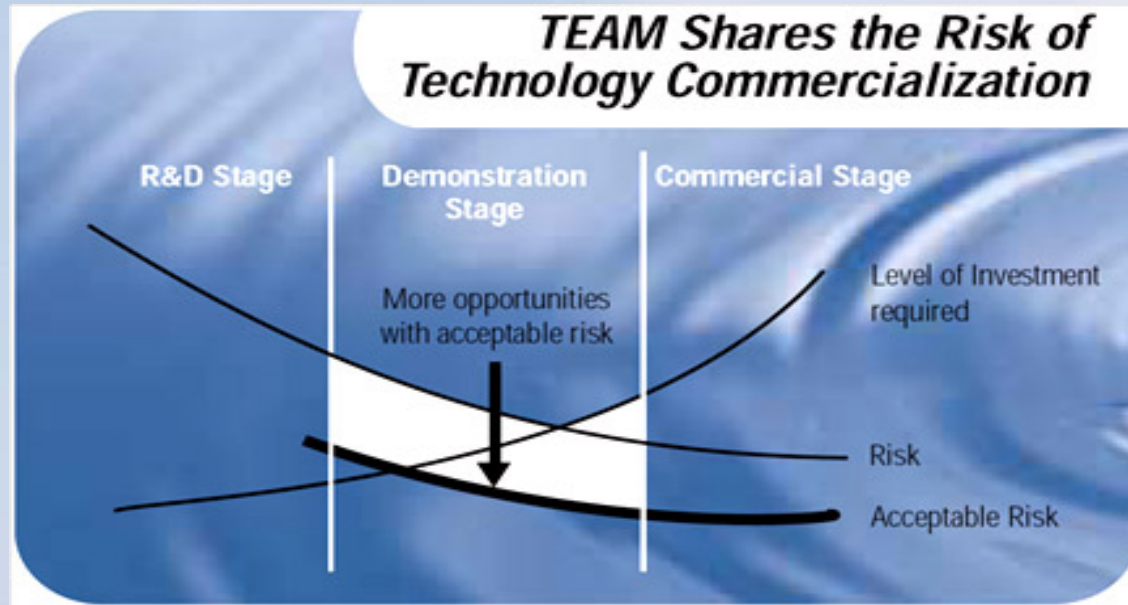


# TEAM Activity Summary

- **101 projects completed or allocated to date from Phases I & II (1998-2004)**
  - total value of \$971M
  - Based on \$95M TEAM + \$101M federal programmes + \$775M mostly private, plus other governments
- **Phase III funds \$63M (2004-2008)**
  - 13 projects allocated \$18M, total project value ~\$56M
- **326 companies, 46 federal agencies, 49 other government agencies**
- **16 International projects in 14 countries**

# TEAM's Mission

Technology late stage development and first demonstration in support of early action to reduce GHG emissions, nationally and internationally, while sustaining economic and social development.



# What is TEAM? (1) – Creating Deal Flow

- **TEAM structures climate change technology deals from anywhere, anytime**
- **TEAM works across all federal departments**
  - enables commercialization where & when appropriate
- **TEAM adds value to SMEs**
  - advises & consults on business planning, project development, R&D planning
  - Identify resources for technical + financial support
- **TEAM adds value for financial investors & for large end-users**

# TEAM Objectives for Deal Flow

- **Develop economic opportunities to generate wealth domestically & internationally**
- **Expedite technology to market by linking to follow-on investors & market forces**
- **Provide options & opportunities for future government energy policy & programmes**
- **Aid companies in understanding what they have through technical performance**
- **Increase “Quantity of quality deals” to achieve multiple mandates & objectives**

# Considerations for developing technology demonstration projects

- Are the technology suppliers, benefactors and end-users sharing demonstration risk?
- Does company have technical and/or business expertise? Able to self-identify weaknesses?
- Does company have focus and vision to understand the road ahead?
- Is there after-market support for operations & maintenance of technology? **CRITICAL** to sustainability & market uptake
- What is left behind when the demonstration is completed?

# What is TEAM? (2) – Performance Measurement and Results

- Most companies are not adequately prepared to assess GHG impacts of their own technologies, processes, facilities, etc.
- Created our System for Measurement and Reporting on Technologies (SMART) to meet TEAM requirements, since no reasonable off the shelf protocols existed
- TEAM's SMART protocol provides 3<sup>rd</sup> party evaluation & measurement of technology performance and GHG reduction

# What is SMART?

- Presently, SMART is a platform for national and international consistency, including basis for new ISO 16064 GHG standards
- SMART is a 2<sup>nd</sup> party validation, it is not a verification
- Set up a Request for Supply Arrangement through federal contracting system (MERX)
  - first call ended in 2003
  - current call will end in January 2007

# SMART Prequalified 3<sup>rd</sup> Party Consultants

- **To pre-qualify, each firm/team was required to demonstrate expertise and experience for:**
    - ✓ **Team Leader(s)**
    - ✓ **Technical Expert(s)**
    - ✓ **GHG Expert(s)**
    - ✓ **Environmental/Auditing expert(s)**
- for each technology area bid on.**

# Prequalified Consultant Categories

## *Renewables*

- Solar
- Wind
- Small Hydro

## *Energy Efficiency*

- Energy Efficiency
- Community Energy Systems
- Waste and Landfills

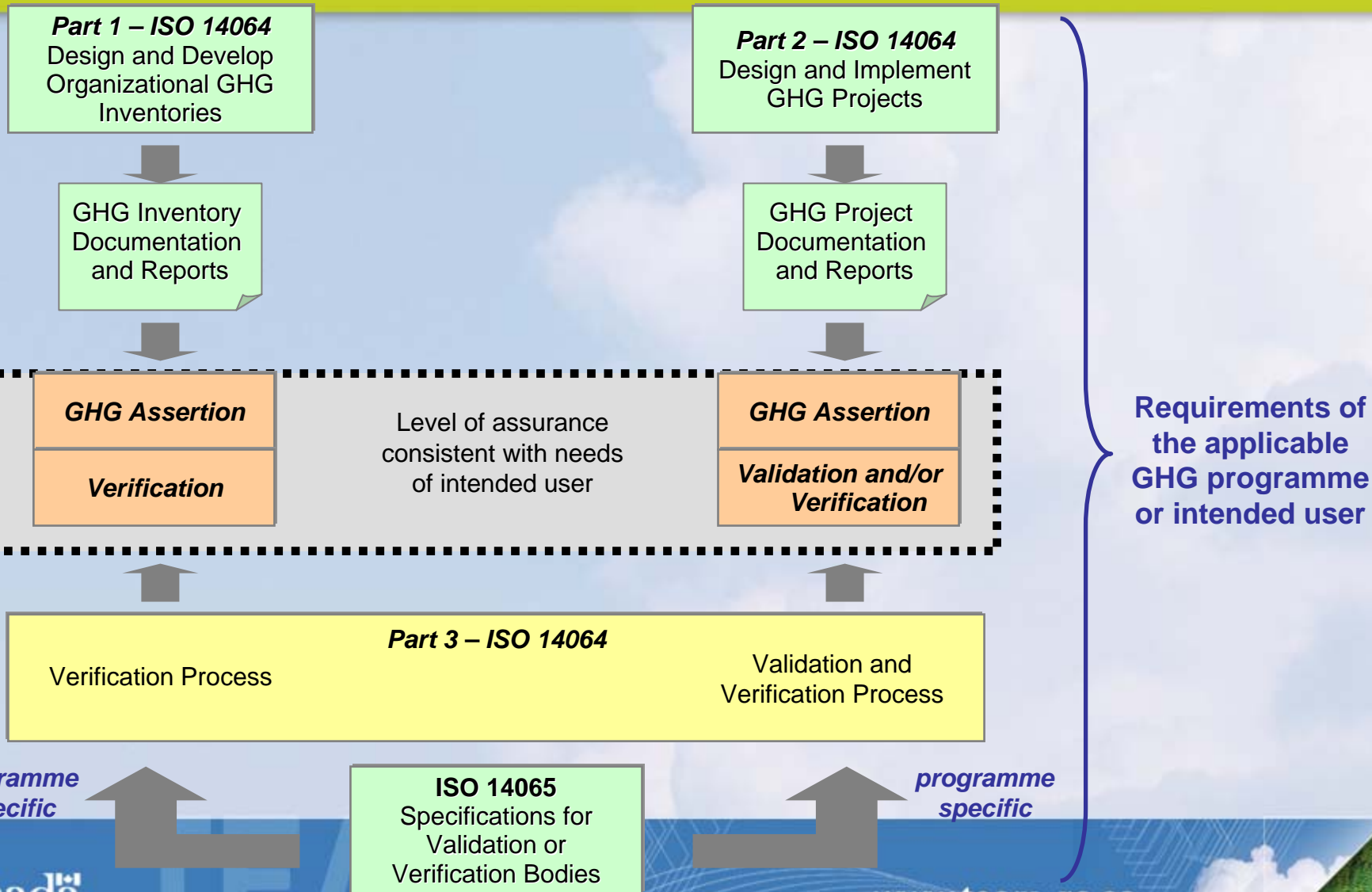
## *Alternative Fuels & Fuel Cells*

- Alternative Fuels
- Biofuels
- Fuel Cells and Hydrogen

## *Industry & Fossil Fuels*

- Industrial Processes
- Fossil Fuels

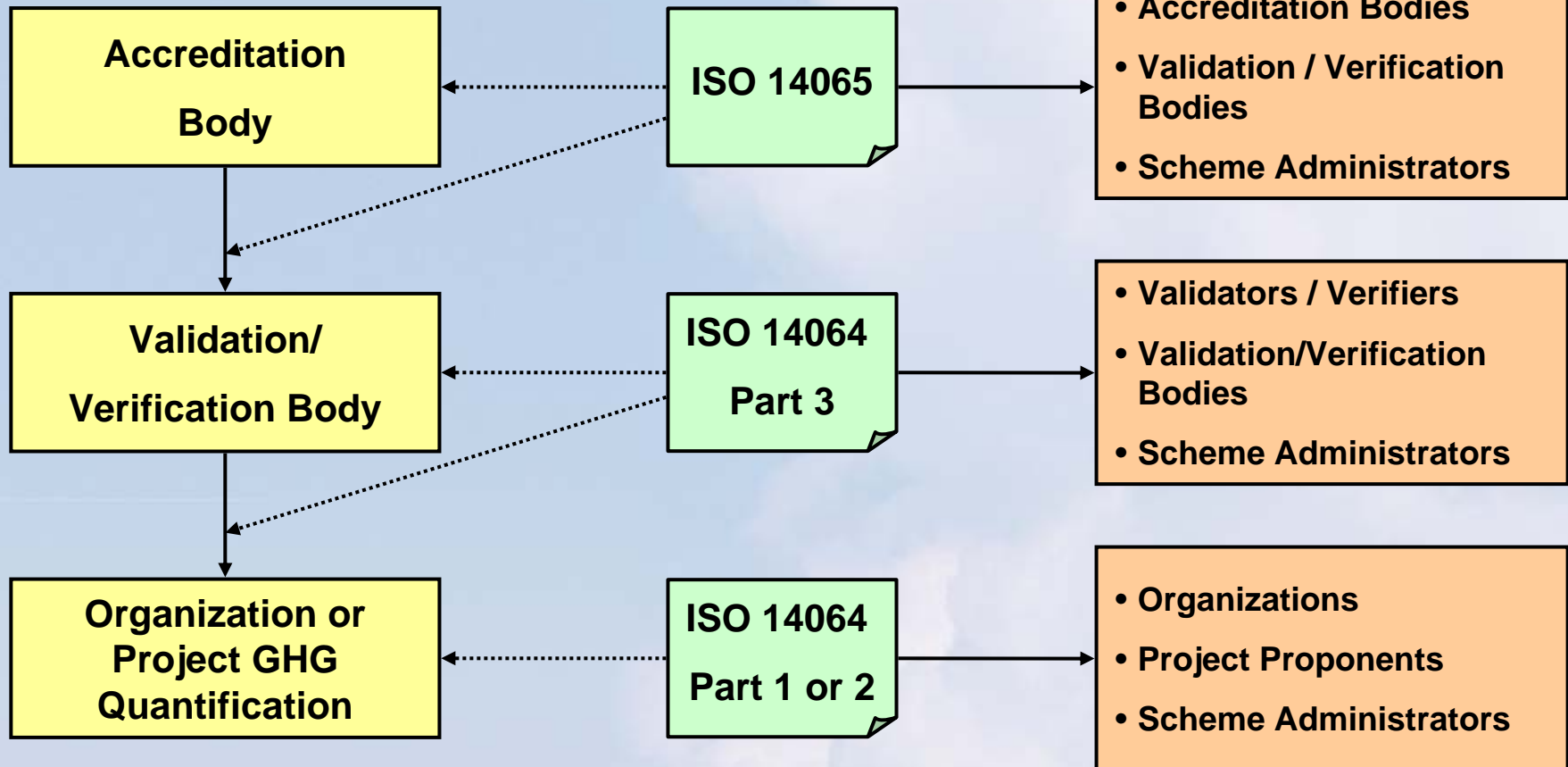
# ISO 14064/65 Framework



# ISO 14064/65 Users

## ISO Standard

## Users



# SMART and ISO 14064 Standard (1)

- **TEAM is co-chair of Canadian Advisory Committee for ISO 14064.**
- **TEAM strongly contributed to ISO 14064 Part 2 based on our SMART protocol.**
- **SMART is compliant with ISO 14064 Part 2 requirements.**
- **SMART contains extra programme specific requirements.**

# SMART and ISO 14064 Standard (2)

## TEAM works closely with other best practices:

- World Resources Institute (WRI)
- World Business Council for Sustainable Development (WBCSD)
- IEEE
- Other Canadian technology funding agencies
- Emerging Canadian Offsets system and GHG protocols
- Leadership role in training and capacity building

# Some TEAM Projects in Canada: Montreal Biodiesel Transit Buses



## Project Summary:

- Test use of biodiesel for public transit
- Biodiesel supplied to STM's terminal for use on 155 buses for one year (550, 000L biodiesel from animal and vegetable fat, and cooking oil in B5 and B20 blends)
- No maintenance issues, better lubricity, better ignition performance

## Partners:

- Canadian Renewable Fuels Association
- Société de transport de Montréal (STM)
- Federation des producteurs de cultures commerciales du Quebec (FPCCQ)
- Rothsay/Laurenco
- Environment Canada
- Developpement Economique Canada
- Quebec Provincial Government

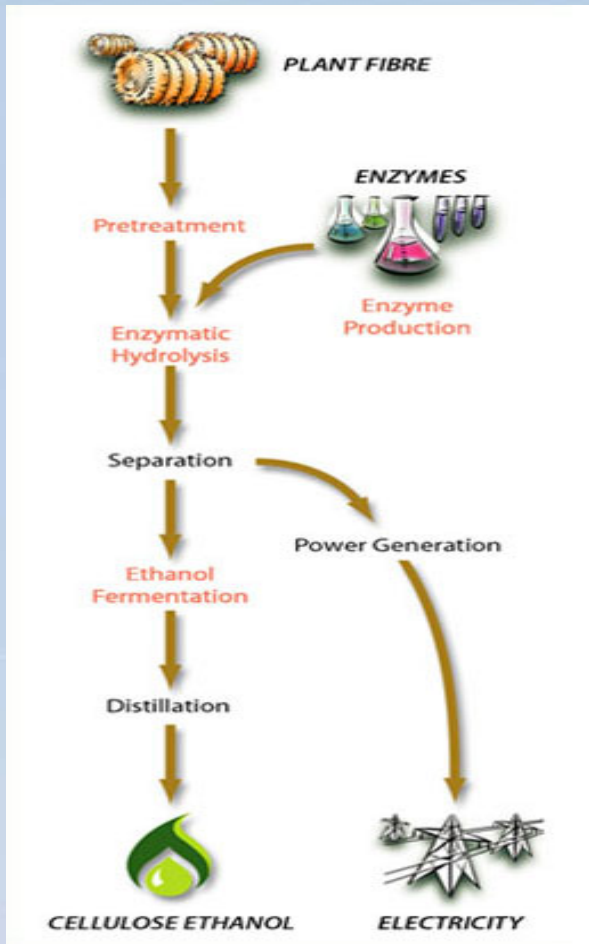
## Financial Summary (\$CDN):

<b>Total Project Cost</b>	<b>\$3, 701, 000</b>
TEAM Contribution	\$ 436, 000
Other Federal	\$ 100, 000

## GHG SMART Results:

- 2.36 t CO<sub>2</sub>e/1, 000 L of 100% biodiesel

# Production of Ethanol from Agricultural Waste and Crops



## Project Summary:

- Previous project with **IOGEN** looked at various enzymes to improve their process
- Process uses fibrous farm wastes (corn stalks, husks, wheat straw)
- Design and construction of a demonstration facility, start-up, operation, process development and applied R&D
- Facility is now operational and selling bio-ethanol commercially

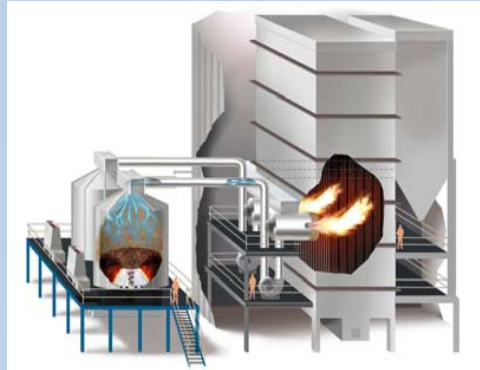
## Financial Summary (\$CDN):

Total Project Cost:	<b>\$45, 500, 000</b>
TEAM Contribution:	\$ 4, 980, 000
TPC:	\$ 4, 987, 000

## Partners:

- Iogen
- Petro Canada

# Heffley Creek Biomass Gasification Demonstration



## **Project Summary:**

- Demonstration of a biomass gasification system using waste wood material
- Two stage process: gasification and oxidation (to clean flue gas)
- Production of flue gas for heat in veneer dryers and hot water for log conditioning
- Potential for other biomass feed (i.e., poultry litter)

## **Partners:**

- Nexterra Energy
- Tolko Industries
- University of British Columbia
- Ethanol BC
- ARC Financial

## **Financial Summary (\$CDN):**

<b>Total Project Cost</b>	<b>\$6, 059, 000</b>
TEAM Contribution	\$1, 750, 000
Other Federal	\$ 297, 000

# Turnkey Integrated Manure Utilization System



## Project Summary:

- Demonstrate mesophilic anaerobic digestion technology, biogas used in combined heat and power systems
- Converts manure into electricity, heat and digestate used as fertilizer and water suitable for irrigation
- Electricity used on-farm/sold onto grid

## Partners:

- Lynn Cattle
- RENTEC Renewable Energy Technologies
- Trent University
- Agriculture Canada
- Federation of Canadian Municipalities (FCM)
- Ontario Cattle Feeders Association
- Toromont/Caterpillar

## Financial Summary (\$CDN):

<b>Total Project Cost</b>	<b>\$6, 755, 000</b>
TEAM Contribution	\$ 712, 000
Other Federal	\$ 150, 000

# Preventing Pollution while making Manure Profitable



## **Project Summary:**

- Development of a hybrid technology to convert hog manure into fertilizer and irrigation liquid
- Includes drying, settling, dewatering with aerobic digestion coupled with the production of bio-fertilizer
- Demonstration site is running successfully

## **Partners:**

- Envirogain
- Agrior
- Centre d'excellence en production porcine
- Environment Canada
- Développement Economique Canada

## **Financial Summary (\$CDN):**

<b>Total Project Cost</b>	<b>\$1, 700, 000</b>
TEAM Contribution	\$ 500, 000
Other Federal	\$ 300, 000

## **GHG SMART Results:**

- 0.54 t CO<sub>2</sub>e/t manure

# Animal Manure as Renewable Energy



## Project Summary:

- Combines thermophilic anaerobic digestion and aerobic composting – converts manure into energy, fertilizer and reusable water
- Current target is livestock operations with 100 tonnes organic waste/day (but can be scaled down as process is optimized)
- Currently providing power to 700 homes in the area

## Partners:

- Highland Feeders
- Alberta Research Council
- Rick Paskal Livestock
- Agriculture and Agri-Food Canada
- Alberta Agriculture, Food and Rural Development
- CETAC-West

## Financial Summary (\$CDN):

<b>Total Project Cost</b>	<b>\$7, 853, 000</b>
TEAM Contribution	\$ 818, 000
Other Federal	\$1, 950, 000

## GHG SMART Results:

- 0.93 t CO<sub>2</sub>e/MWh<sub>e</sub> or
- 0.71 t CO<sub>2</sub>e/t manure

# **TEAM International Project Portfolio (1998-present)**

## ***Alternative Transportation fuels & technologies***

### **CNG India project**

**Project location: India**

**Key Partners: ATFCAN, consortium of Canadian & Indian companies, TEAM, Environment Canada**

- **TEAM investment: \$3.55M, project value \$8.3M**

### **NG Conversion of Motorcycles and Autorickshaws**

**Project location: Egypt and Pakistan**

**Key Partners: Yugo-Tech Inc., TEAM, Industry Canada/Sustainable Cities Initiative, Environment Canada**

- **TEAM investment: \$0.80M, project value \$2.0M (Egypt)**
- **TEAM investment: \$0.35M, project value \$1.25M (Pakistan)**

# CNG India Project in Mumbai & Delhi



## Project Summary:

- India is one of the top markets for natural gas vehicles in the world
- Consortium aims to introduce emerging, advanced Canadian natural gas vehicle technologies to the Indian market

## Partners:

Proponent: Alternative Technologies and Fuels Canada Ltd. (ATFCAN)  
Canadian Project Technology Providers and Indian partners to be announced

## Financial Summary::

<b>Total Project Cost</b>	<b>CDN \$8.3 million</b>
TEAM Contribution	CDN \$3.55 million
Federal Partners	CDN \$56,000

Indian investment is about CDN\$4 million

# TEAM International Project Portfolio (1998-present)

## *Harnessing Landfill Energy*

**Energy from Waste Cell Technology**      Project location: Argentina

Key Partners: Conestoga Rovers & Assoc., TEAM, Industry  
Canada/Sustainable Cities Initiative

- TEAM investment: \$0.987M, project value \$2.28M

**Landfill Methane Recovery Bioreactor**      Project location: Egypt

Key Partners: R.J. Burnside, Golder Assoc., Conestoga Rovers & Assoc.,  
TEAM, Industry Canada/Sustainable Cities Initiative

- TEAM investment: \$0.76M, project value \$1.7M

**Peak Electrical Power Generation utilizing landfill gas**

Project location: Brazil

Key Partners: R.J. Burnside, Golder Assoc., Conestoga Rovers & Assoc.,  
TEAM, Industry Canada/Sustainable Cities Initiative

- TEAM investment: \$0.80M, project value \$2.0M

# Energy from Waste in Argentina



## **Project Summary:**

- Landfill waste placed into “energy cells”
- 22,000 tonnes of municipal waste capacity
- Demonstrated acceleration production of landfill gas versus conventional landfill
- Subsequent project in Argentina based on demonstration uses LFG to treat medical waste

## **Partners:**

- Conestoga-Rovers & Associates (CRA)
- Tecna S.A.
- Limpieza Urbana S.A. (LIMSA)
- Coordinación Ecológica Area Metropolitana Sociedad del Estado (CEAMSE)
- Canadian International Development Agency

## **Financial Summary (\$CDN):**

<b>Total Project Cost</b>	<b>\$2, 280, 000</b>
TEAM Contribution	\$ 987, 000
Other Federal	\$ 240, 000

## **GHG SMART Results:**

- 0.6 t CO<sub>2</sub>e/t waste in energy cell

# Peak Electrical Power Generation from Landfill Gas in Brazil



## **Project Summary:**

- Design, construction and installation of LFG utilization system for use on an existing landfill
- First demonstration in South America
- Electricity generated is used to provide lighting at the landfill and for an adjacent soccer field

## **Partners:**

- Conestoga-Rovers & Associates
- Golder Associates
- R. J. Burnside International
- Municipal Solid Waste Department of the Municipality of Salvador
- Company of Urban Development of the State of Bahia
- Industry Canada

## **Financial Summary (\$CDN):**

<b>Total Project Cost</b>	<b>\$1, 988, 000</b>
TEAM Contribution	\$ 797, 000
Other Federal	\$ 180, 000

# TEAM International Project Portfolio (1998-present)

## *Renewable Energy Technologies*

### PV manufacturing for developing countries

Project location: China

Key Partners: Canadian Solar Inc., ATS Automation Tooling Systems, TEAM, NRCan/PV & Hybrid program, CIDA Inc.

- TEAM investment: \$3.2M, project value \$10.4M

### Multi-country Solar crop drying

Project location: India, Costa Rica, Panama, Brazil, China

Key Partners: Conserval Eng., TEAM, NRCan/Active Solar program

- TEAM investment: \$.58M, project value \$1.58M

### Low Head/Small Hydro Control Systems

Project Location: Poland, China

Key Partners: ESI Ecosystem Int'l, Swiderski Eng., Powerbase Inc., TEAM, NRCan/Hydraulics program

- TEAM investment: \$0.75M, project value \$12.1M (Poland)
- TEAM investment: \$0.60M, project value \$3.3M (China)

# TEAM International Portfolio Summary

**16 projects spurred by:**

- **\$67.5M in economic activity**
- **\$15.8M in TEAM investment**
- **\$5.2M in other Canadian federal program support**
- **\$25M in foreign private & government investment**

*Thank you...*