



# TOTAL: A RESPONSIBLE AND EXPERIENCED ARCTIC PARTNER

Jean-Eric MOLINARD

TOTAL E&P Russia

# TOTAL BY THE NUMBERS (2011 PERFORMANCE INDICATORS)

Extensive  
global reach

**over 130  
countries**

More than

**700**  
industrial facilities

**96,104**  
employees

Sales

**€184.7**  
billion

+16%

Adjusted net income

**€11.4**  
billion

+11%

2012  
capital expenditure

**\$24**  
billion

R&D  
spending

**\$7** billion  
between 2010  
and 2015

**5<sup>th</sup>**

-ranked

international  
oil and gas  
company

# OUR ORGANIZATION

## Upstream

- Exploration & Production of Hydrocarbons
- LNG
- New Energies

## Refining & Chemicals

- Refining
- Base Chemicals
- Special Chemicals
- Trading & Shipping

## Marketing & Services

- Supply & Marketing of refined products and special products (LPG, lubricants, bitumen )
- Services

# EXPLORATION & PRODUCTION

## 2011 PERFORMANCE INDICATORS

Operations in more than **40 countries**

---

**13 years** of proved reserves

---

Production: **2.35 Mboe/day**

---

Production growth target: average of **2.5%** per year to 2015

---

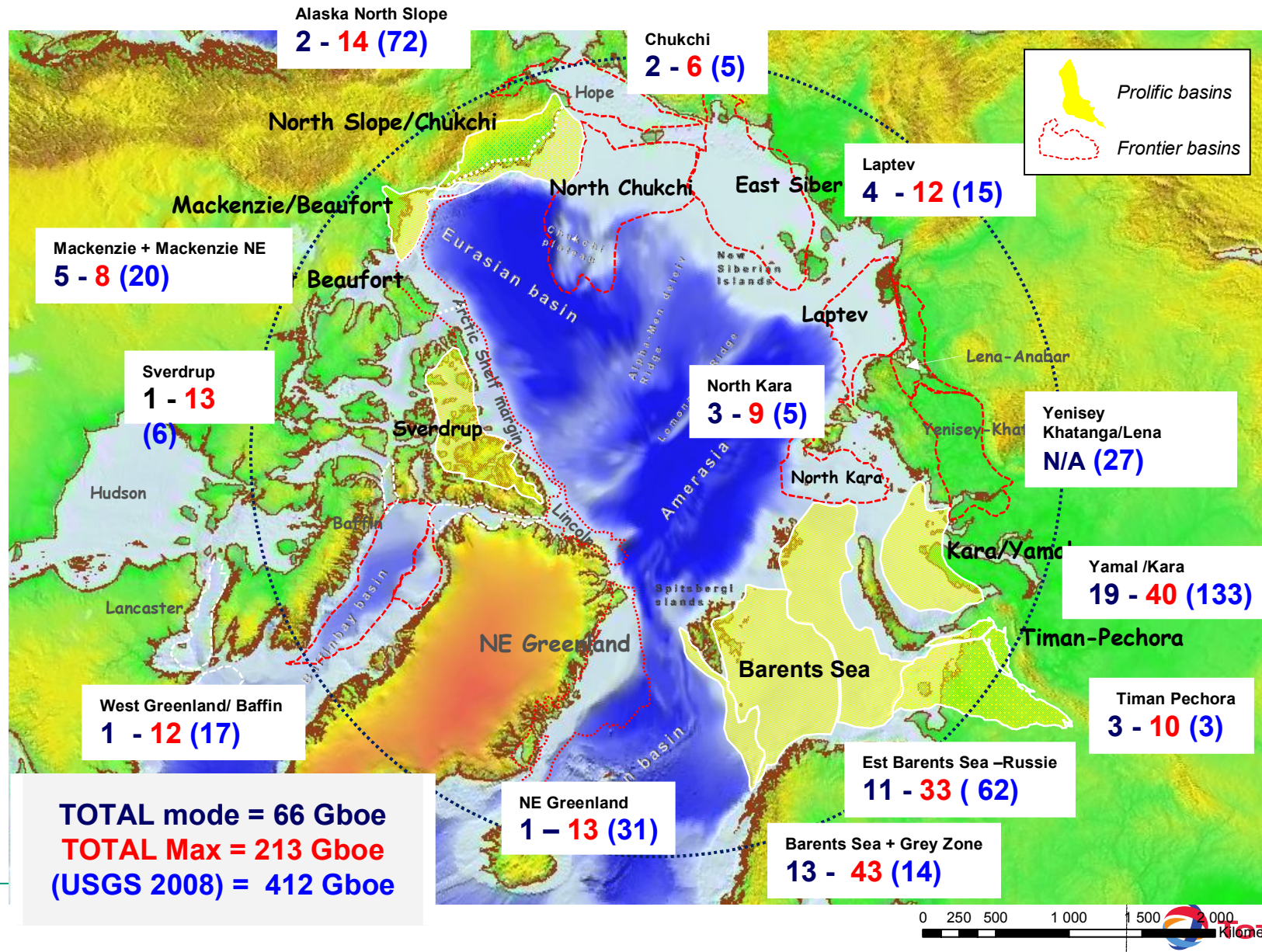
Access to **3.6 Bboe** of new resources in 2011 through exploration and acquisitions

---

Global **No. 2** LNG operator

---

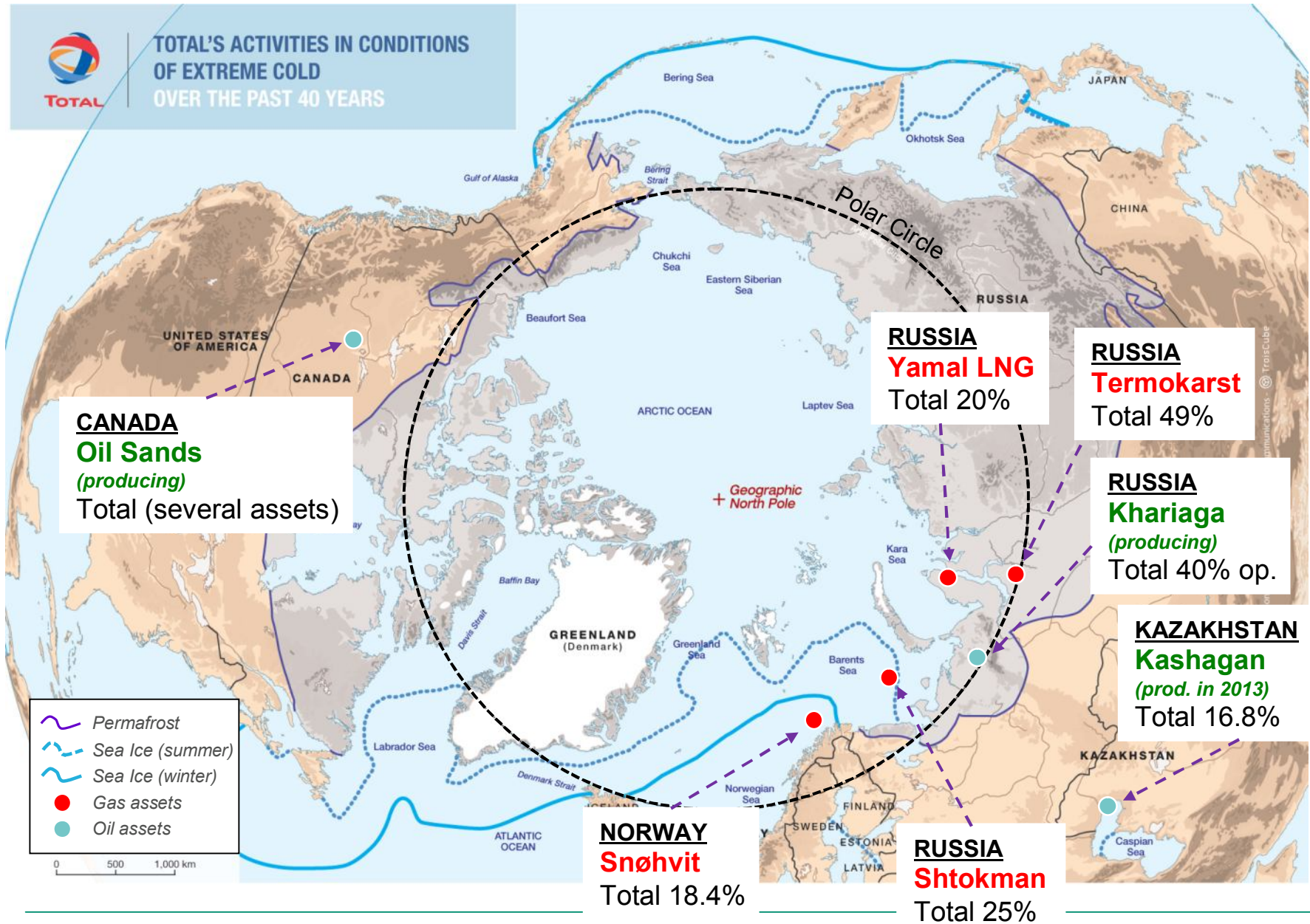
# CIRCUM ARCTIC - YTF (GBOE) ACCORDING TO TOTAL



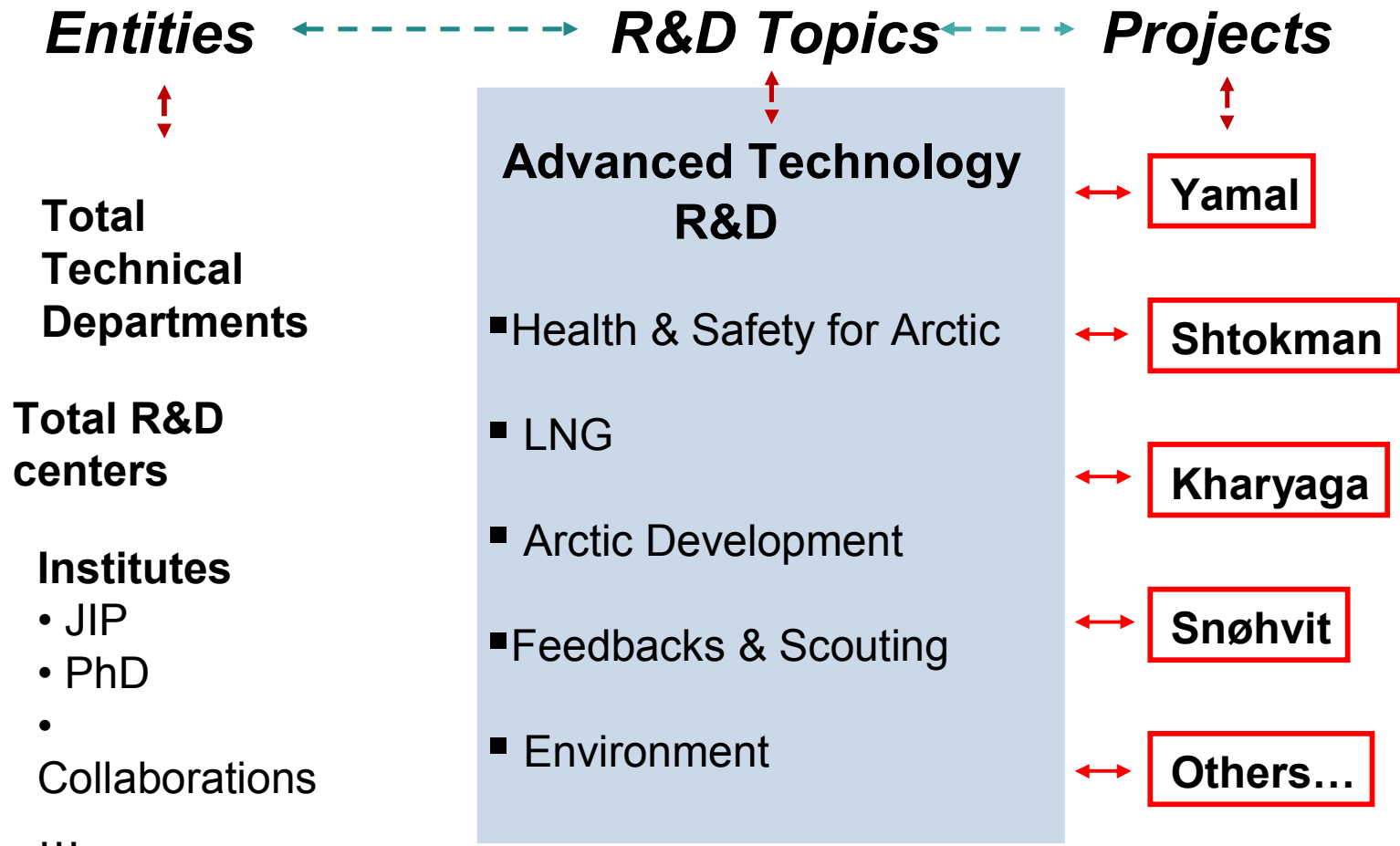




**TOTAL'S ACTIVITIES IN CONDITIONS OF EXTREME COLD OVER THE PAST 40 YEARS**



# ARCTIC, THE NEXT FRONTIER – TOTAL, A RELIABLE PARTNER



Acquisition / consolidation of an internal expertise  
 Arctic: a step-out in the industry's knowledge

# TOTAL R&D ON ARCTIC FOCUSED ON 4 AREAS

*Specific R&D program launched in 2008*

## Health & Safety

- R&D program on proprietary winterization technology
- Development of new solutions to protect / facilitate work
- Define logistics rules adapted to each area of concern
- Escape Evacuation and Rescue

## Development

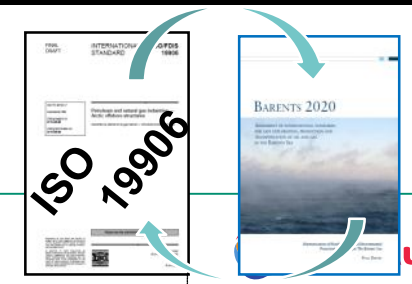
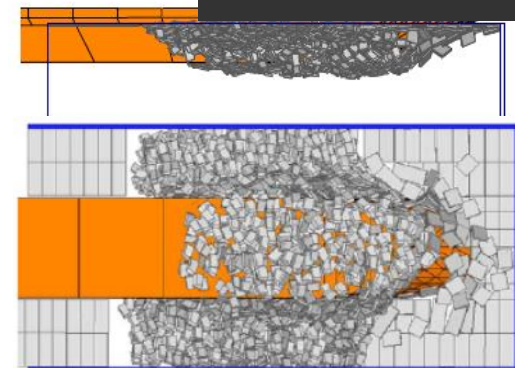
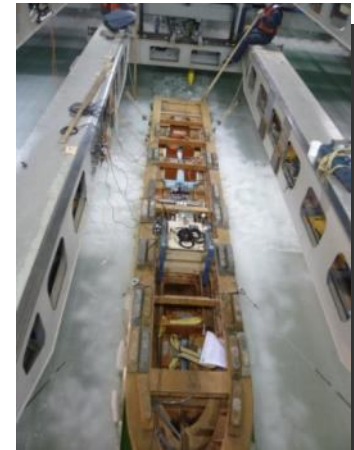
- Permafrost characterization & monitoring (SOI collaboration)
- Development of new materials and/or technologies imported from other industries
- Adequate monitoring technologies
- Design of specific installation for LNG storage on permafrost
- Gap analysis of existing technology vs needs

## Environment

- Adaptation of techniques for a zero harmful discharge policy
- Prevention, early detection & remediation of oil spill (under ice, thaw/frost...): JIP Arctic Response Technology, Biosensors MMBI / Bordeaux University

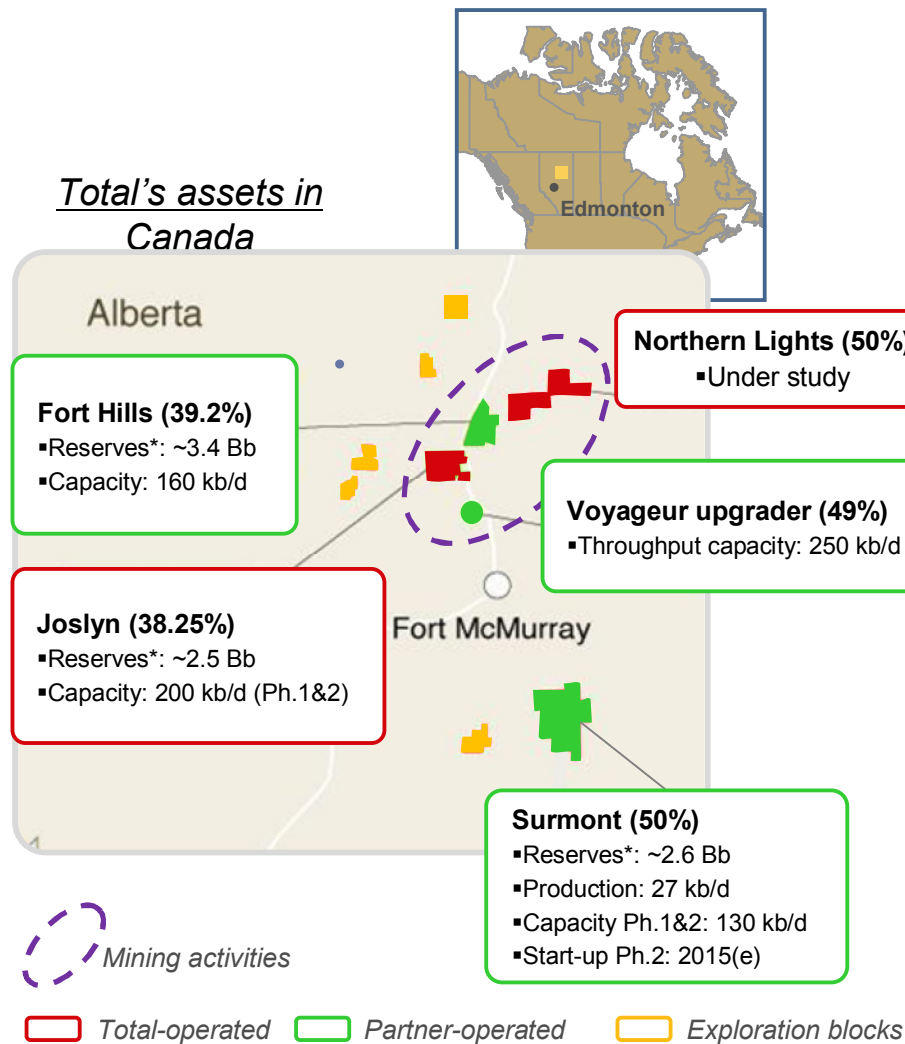
## Standards harmonization

- Development of general guidelines for safe production not only in the Barents sea but also in other Arctic waters (Barents 2020 → ISO/TC67 / SC 8 Arctic Operations)





# TOTAL IN CANADA: AN EXTREME COLD ENVIRONMENT



Proved and probable technical reserves (100%), Total estimates

- ▶ **A mining project, with Suncor as strategic partner**
  - Fort Hills, Joslyn and Voyageur upgrader
  - Northern Lights
- ▶ **A SAGD (Steam Assisted Gravity Drainage) producing asset**
  - Surmont lease
- ▶ **Harsh winter conditions**
  - - 40°C are common in winter
  - Winterization of all equipments
  - Very sensitive environment, slow taiga regeneration



# TOTAL IN NORWAY: SNØHVIT LNG



- ▶ Discovered: 1981
- ▶ Water depth: 250 - 340 m
- ▶ Distance to shore: 140 km (world's longest unprocessed multiphase pipeline)
- ▶ Sub-sea development, CO<sub>2</sub> re-injection
- ▶ Start-up: 2007
- ▶ Gas production: 80 kboe/d
- ▶ Plant LNG capacity: 4.2 Mt/y
- ▶ Total's share: 18.4%

***The first LNG plant in Arctic***

# TOTAL IN KAZAKHSTAN: KASHAGAN

*"D" island, spring 2012*



## ▸ Kashagan faces numerous challenges:

- **technical** (project size, HP, sour gas, shallow water, ...)
- **environmental** (remoteness, climate, ecosystem, ...)
- **financial** (project cost, ...)
- **organizational** (coordination, logistics, ...)
- **human** (different cultures, staffing, local content, sustainable development ...)

## ▸ Phased development

- Phase 1
- Planned in the eastern part of Kashagan (plateau 300 kb/d)
- First oil : 2013
- Full field development
- Cumulated Production : above 10 Gbo over 40 years (plateau 1,500 kb/d)

## ▸ Development in a water depth of 2 to 9 m.

- Reservoir at 4,000 m.
- High pressure (800 Bars)
- High level of H<sub>2</sub>S



# TOTAL IN RUSSIA: KHARIAGA

## Permafrost engineering and operation

- Construction of "pads" (or artificial sand islands), with all installations built on piles anchored in the permanently frozen layers
- Limited number of drilling pads with highly deviated wells reaching up to 5 km of total departure



## Working conditions

- -53°C absolute minimum temperature
- important wind → chilling factor and strict outside working time limitations
- winterization of all equipment is mandatory

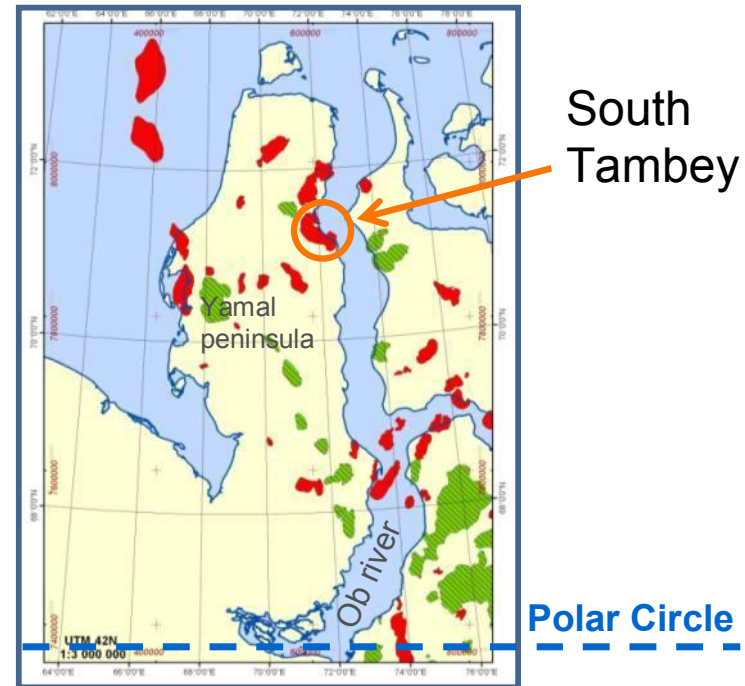




# TOTAL IN RUSSIA: YAMAL LNG PROJECT

## ▶ A major gas & condensate field, an integrated project

Project over ~1000 km<sup>2</sup>, developing 3.9 Gboe with cut-off in 2045, 465 kboe/d at plateau



### LNG - Condensate

- ❑ 3 LNG trains each of 5 to 5.5 Mtpa (16 Mtpa)
- ❑ LNG Storage Tanks

### Port facilities

- ❑ LNG and Condensate Ship-Loading Facility

### Upstream

- ❑ 203 wells on 35 well pads
- ❑ Gas & Condensate treatment

### Shipping

- ❑ Ice breaking specifications, fleet parameters
- ❑ Operated by third party Ship Owners

### Trading & Marketing

- ❑ Western Europe and Asia

# YAMAL LNG HARSH ENVIRONMENT

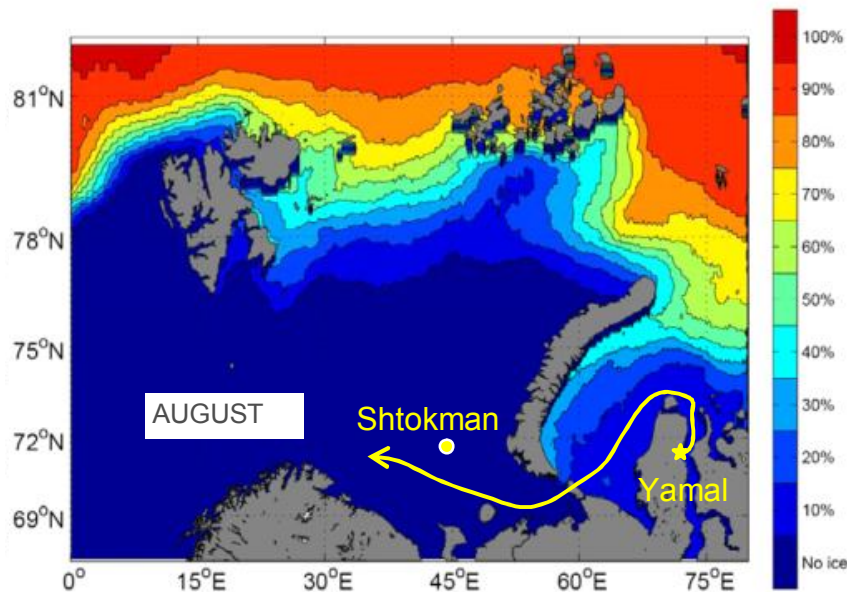
Weather conditions: North of Arctic polar circle

Kara Sea: free of ice 3 months / year + land fast ice (ridges)

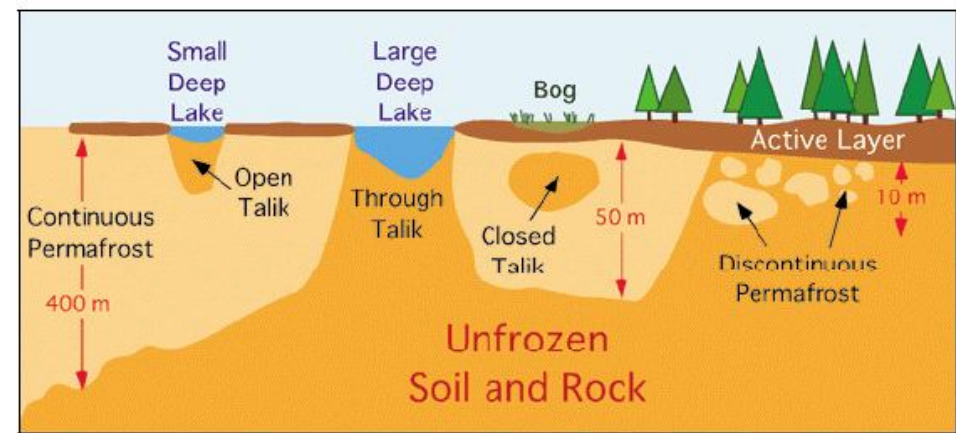
Limited water depth in Ob bay: dredging and discharge of products / impact on fishes.

Sensitive environment: slow growth rate of tundra / ground sensitive to heat / 3 national parks & protected species / comprehensive Oil Spill Contingency Plan (OSCP) to establish.

Permafrost on Yamal: continuous permafrost (active layer: 0.5 to 1m / temperature: - 5 to - 9°C / thickness uncertain: 200 to 400 m)



Extent of sea ice



Tundra ground features

# TOTAL IN RUSSIA: SHTOKMAN

## Strong technical skills required

- Large scale project
  - The largest undeveloped gas field
  - 550 km from the Murmansk area
  - Two mega LNG trains (7.5 mt/year each)
- Remote location
  - Open sea, no other nearby development
- Arctic environment
  - Ice & icebergs, etc.
- Operating conditions
  - Winterization (offshore & onshore)
  - Weather season limitations → autonomy
  - Complex logistics
  - Emergency Evacuation and Rescue issues
- Environmentally sensitive ecosystem





# SHTOKMAN'S ARCTIC CONDITIONS

## Harsh metocean conditions

- Extreme conditions equivalent to Northern North-Sea, associated with rapid changes, strong winds

## Icing

- From atmosphere and sea-spray

## Low temperatures

- Extreme at  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ )

## Snow

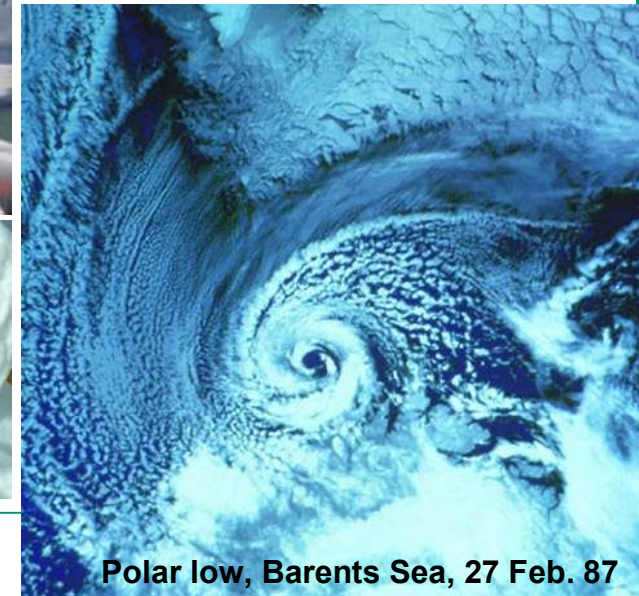
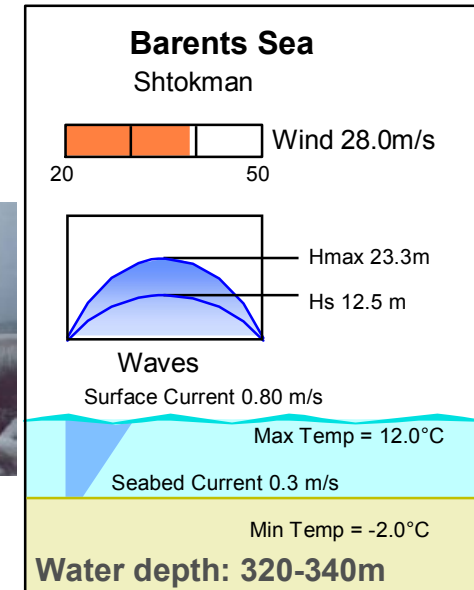
- Twice the thickness encountered in Sakhalin

## Polar night (3 months/year)

- From Dec. to Feb.

## Darkness, fog...

Constant challenges  
to HSE



Polar low, Barents Sea, 27 Feb. 87



# CSR INTEGRAL TO OUR STRATEGY

## Ethics and Human Rights

Ethics Committee reporting directly to the Chairman and CEO

Anti-corruption and compliance programs

- Companywide e-learning
- Global network of compliance officers

Human Rights Internal Guide



Active member of Global Compact LEAD

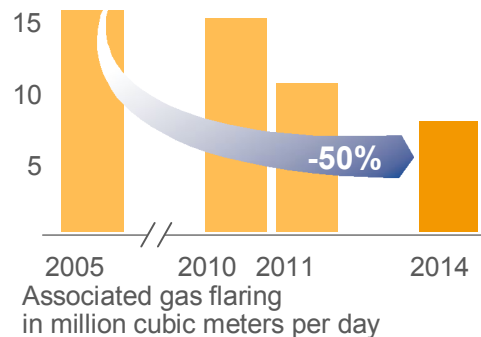
Independent assessments by Good Corporation

## Minimizing Environmental Impact

Limiting greenhouse gas emissions

Improving energy efficiency

Reducing flaring



## Creating Value with Communities

Working with local stakeholders

Emphasizing local content



Pazflor, Angola  
3.6 million man-hours

# SOCIETAL PROJECTS IN MURMANSK REGION

## ► Culture and sports

- Concerts of the Mariinsky Orchestra directed by V.Gergiev (program of the Moscow Easter Festival) in Murmansk
- Northern Festival
- Festivals of French cinema
- Exhibitions

## ► Cooperation in the domain of education

- Cooperation with Murmansk Technical University
- Cooperation with Murmansk international Lycee
- Support to learning of French language

## ► Introduction of French ergotherapy methods in the practice of Monchegorsk social assistance center

Project started in 2012 - first workshop in Monchegorsk



THANK YOU

LISTENING

MUTUAL  
SUPPORT

BOLDNESS

CROSS-  
FUNCTIONALITY

