



International Institute for Energy Systems Integration

Multi-Infrastructure Approaches for Gas and Electricity Distributions Systems

Roch Drozdowski - roch.drozdowski@grdf.fr

Head of mission Smart grids

28 Mai 2014 Strategy Unit - France



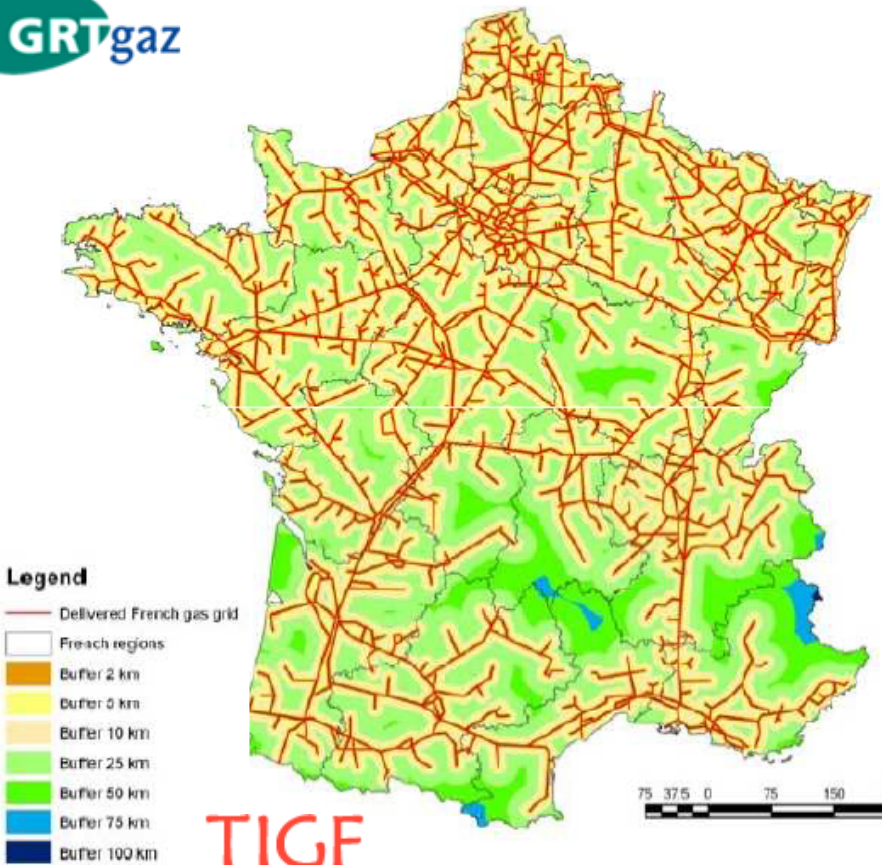
France Gas Infrastructure

Transport distribution network (P>16 bar)

GRTgaz et TIGF : 93% of the territory in a 25 km radius

Transport distribution network (P>16 bar)

GrDF : 77% of France population covered
9 500 communities





GrDF - a Distribution System Operator in an open gas market

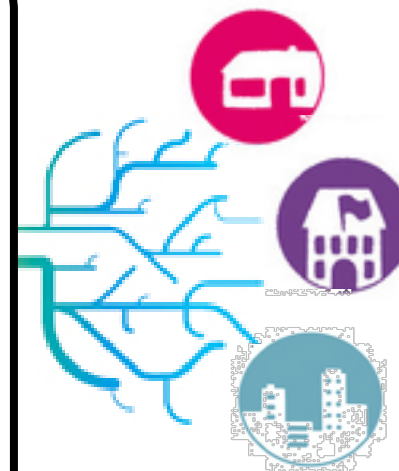
Domestic & commercial

Commercial only

Gas distribution network



1 grid, 1 operator*



11 millions customers

30 gas suppliers

A neutral and independant DSO, operating the gas network for all suppliers and customers
A legal monopoly with a unique regulated tariff

GrDF : 2013 key figures

A distribution network...

- Network length: 195 000 km

... shipping gas to final customers

- 310 TWh
- 30 suppliers
- 11 millions customers

... owned by communities

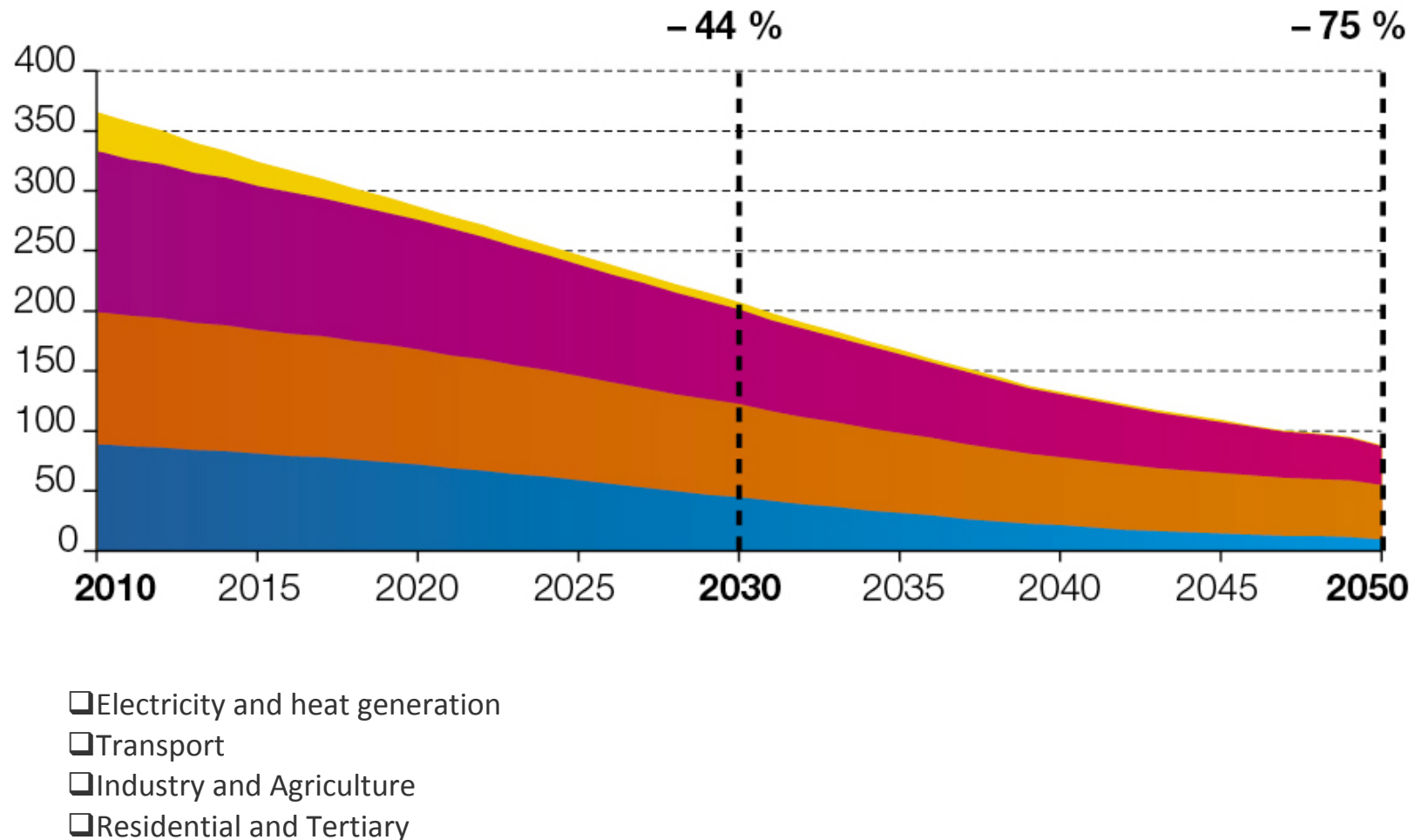
- 9 500 communities with concession contracts
- Accounting for 77% of the French population

A robust business model

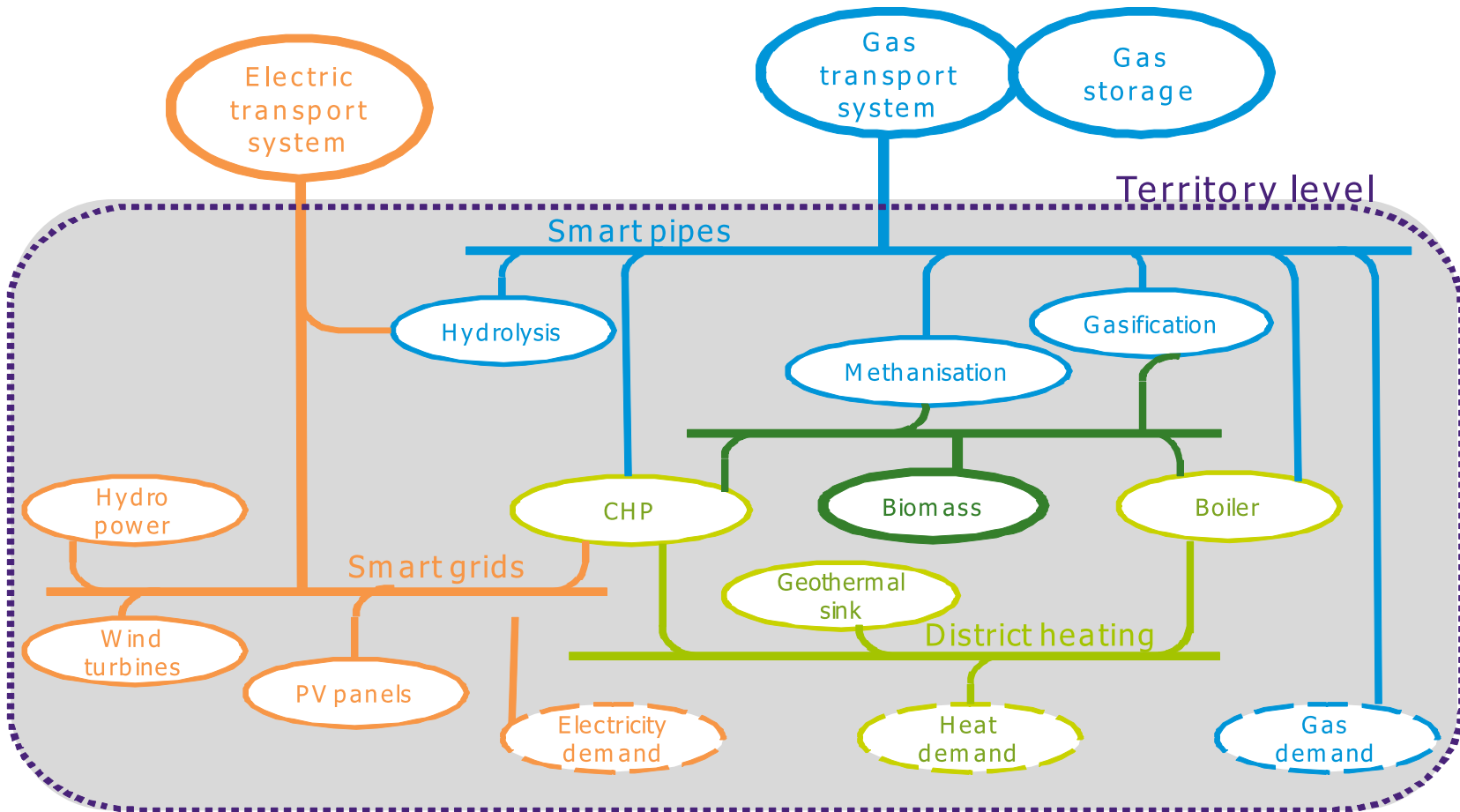
- 2 800 MEUR of turnover
- 700 MEUR invested every year

France – Energy Roadmap

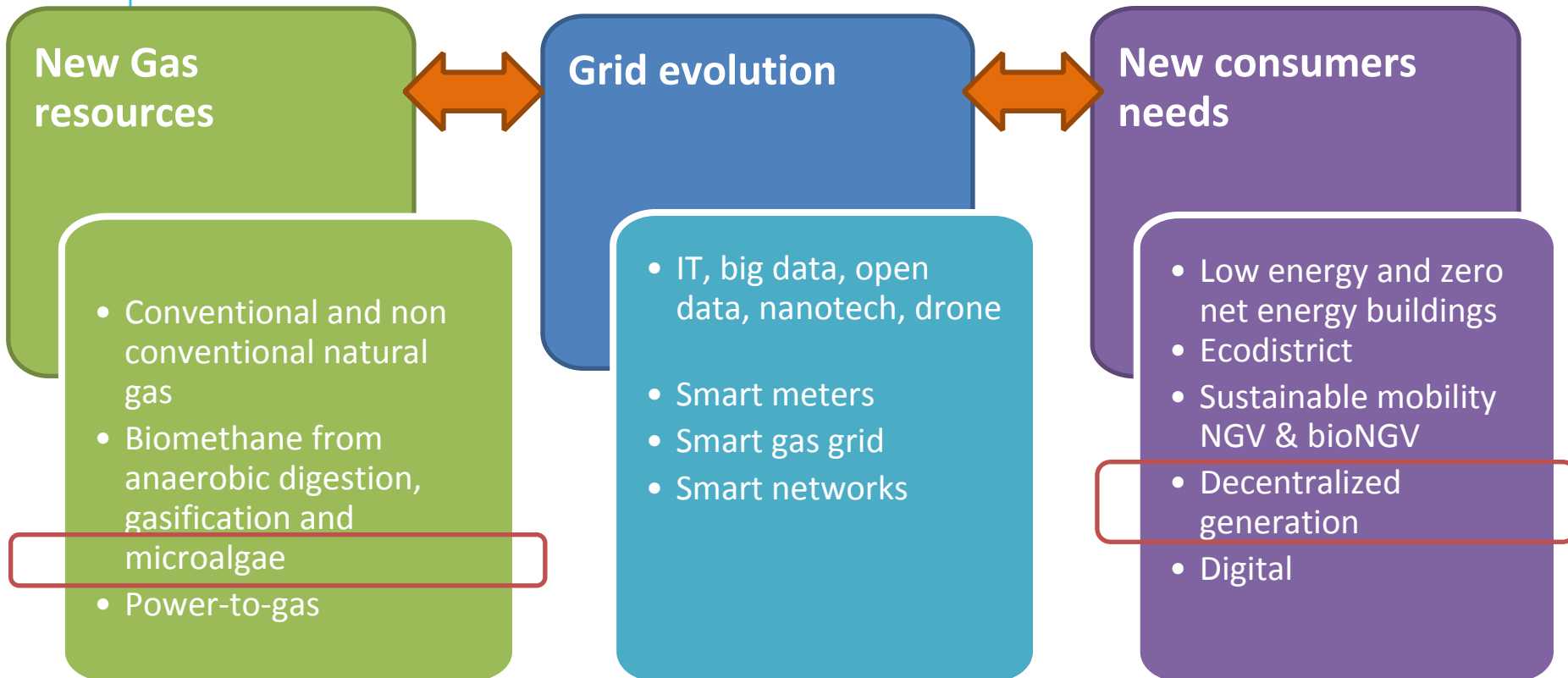
Energy Transition National Debate



Towards smart energy networks

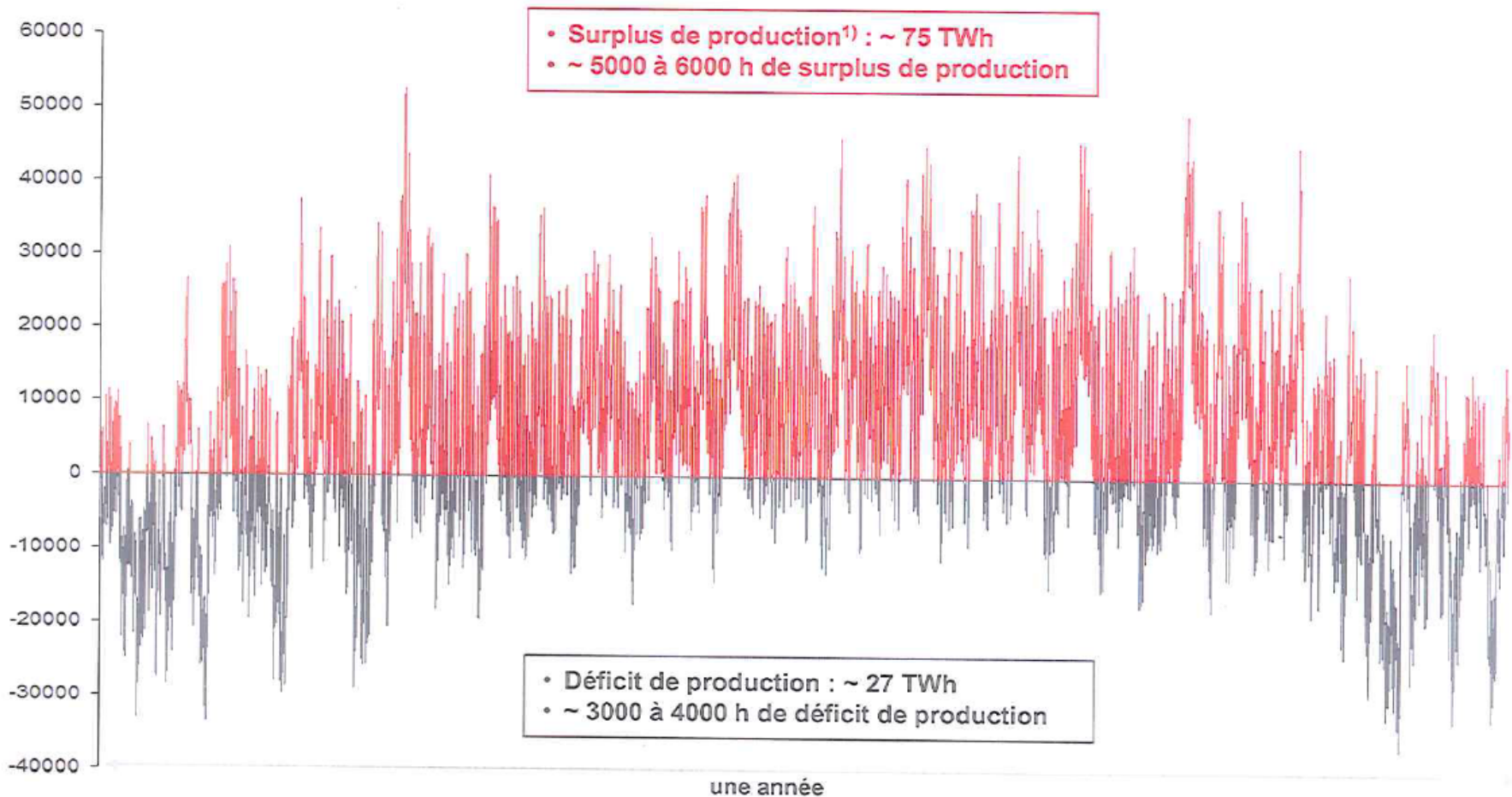


GrDF at the heart of next energy transition

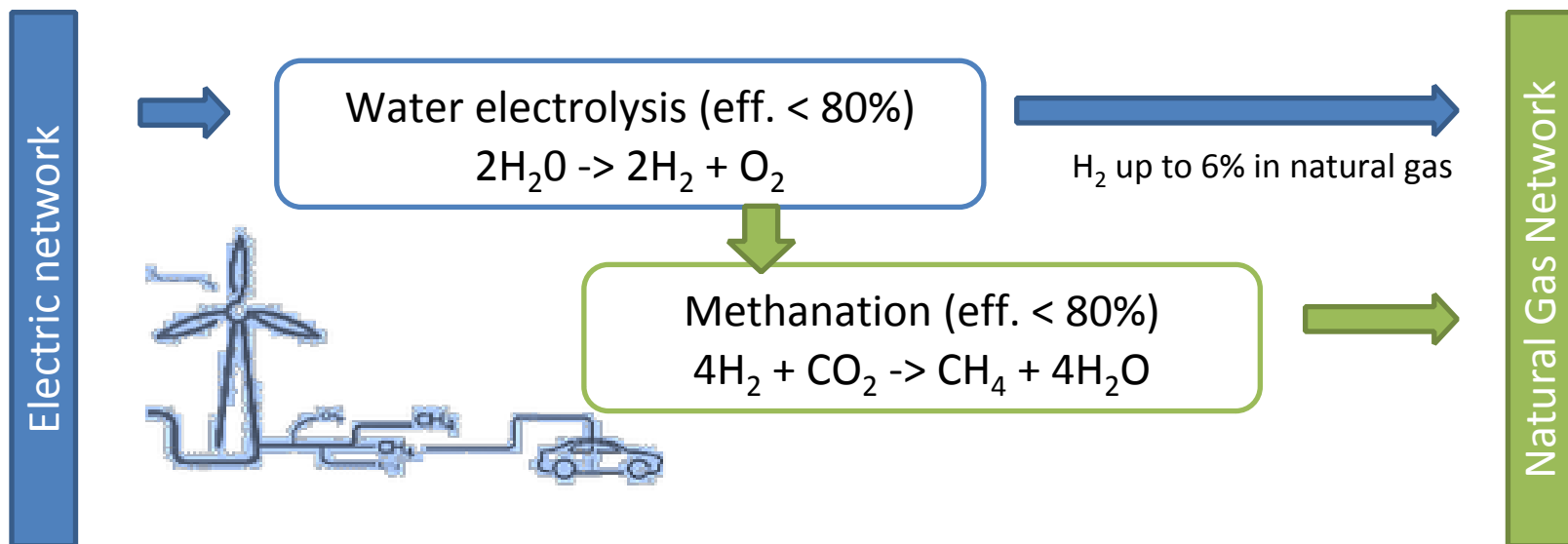


GrDF implements a proactive strategy to anticipate new business

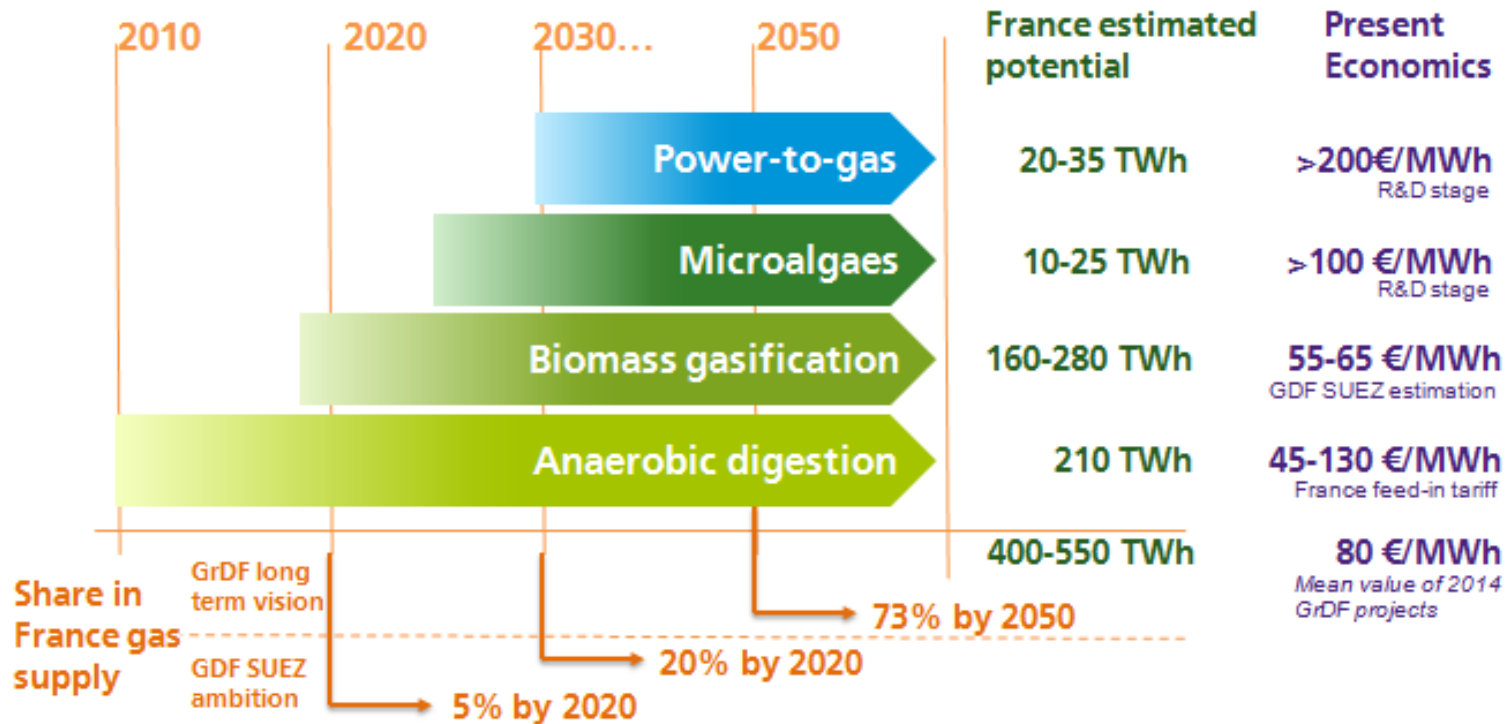
In 2050, excess of renewable electricity production could reach up to 75TWh (5000 to 6000h) and require massive storage capacities



Gas grids as energy storage and flexibility provider



The green gas roadmap implementation

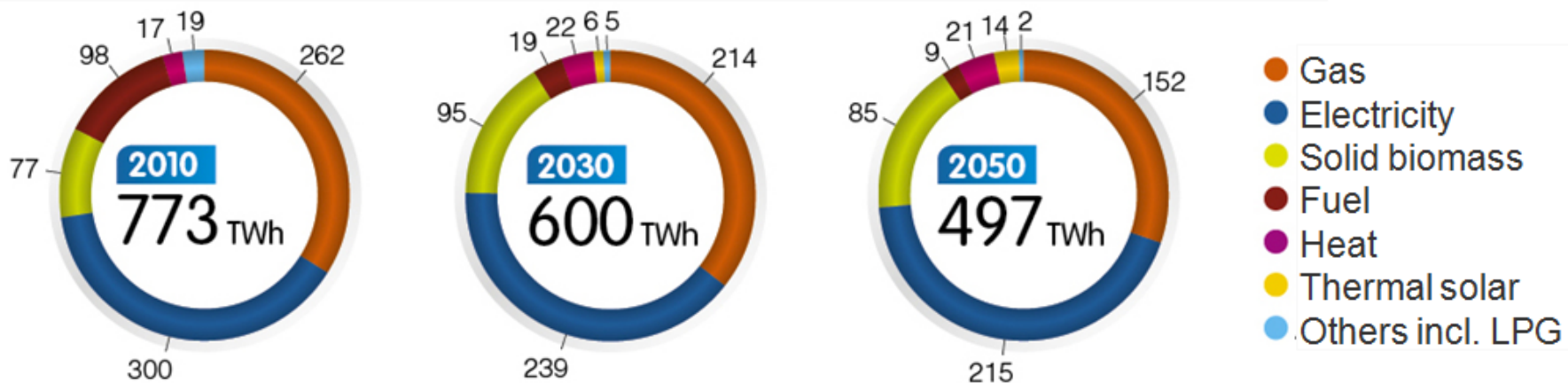


Green gas generation is already a reality for GrDF with 3 injecting site and more than 380 in the projects pipe

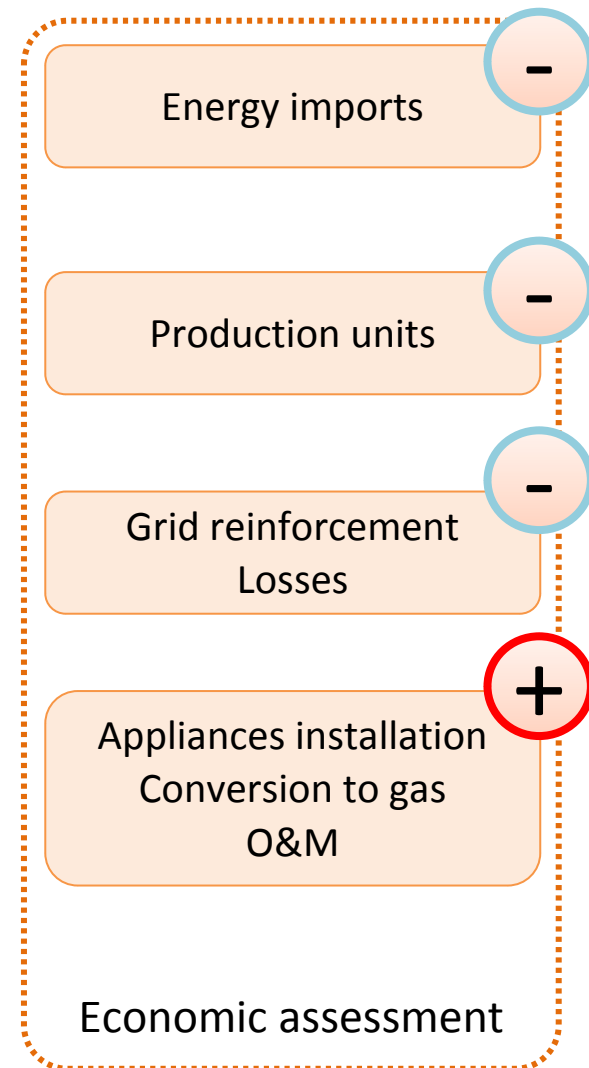
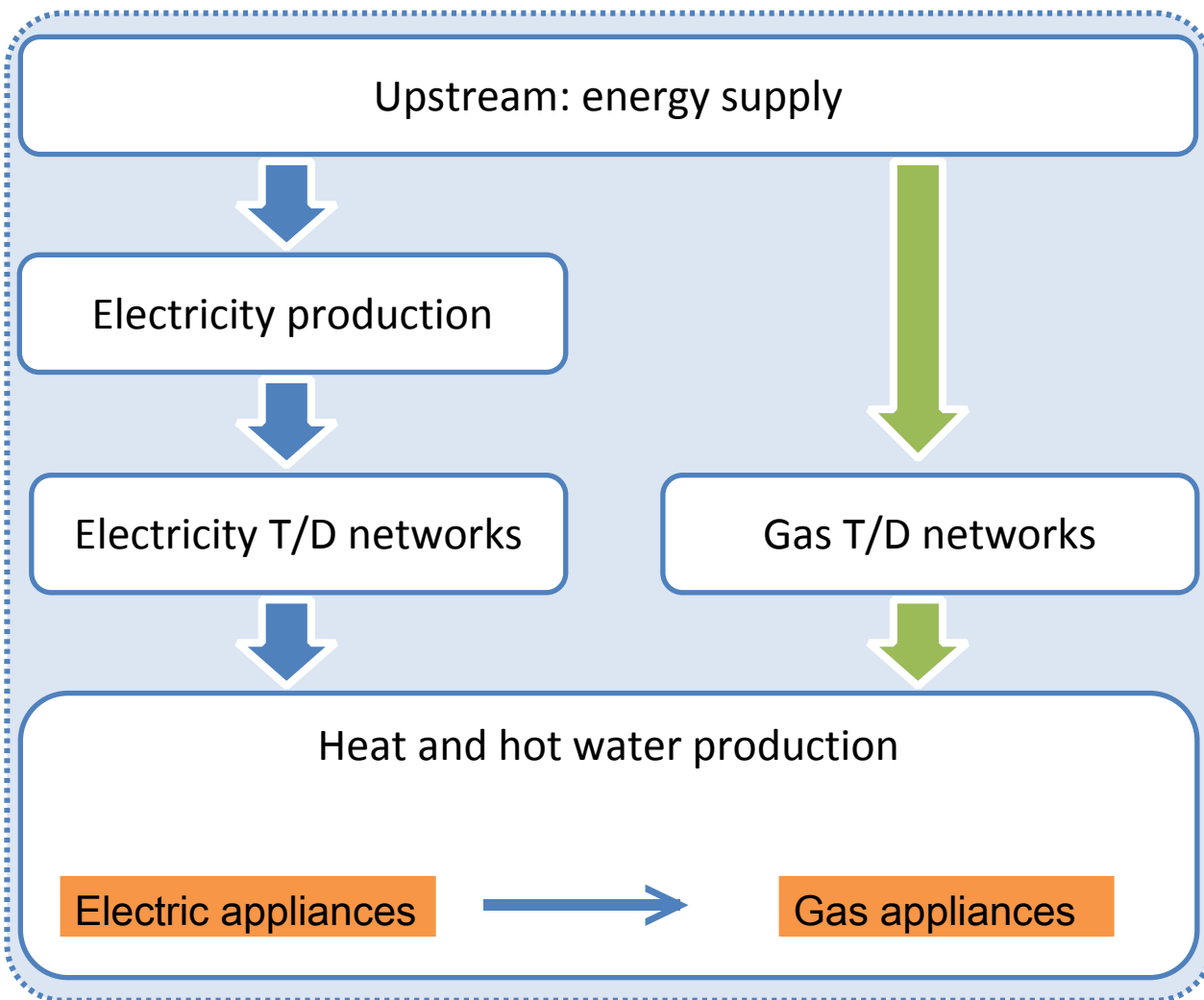
Decentralized energy generation : the future of gas utilization

- The number of dwellings increases from 27 to 37 million from 2010 and 2050.
- Unit consumption decrease: renovation programs (500,000 major renovations per year) and penetration of efficient technologies such as condensing boilers, coupling gas-REN, gas fuel-cell, micro-CHP

Residential and tertiary final energy consumption (TWh per year)



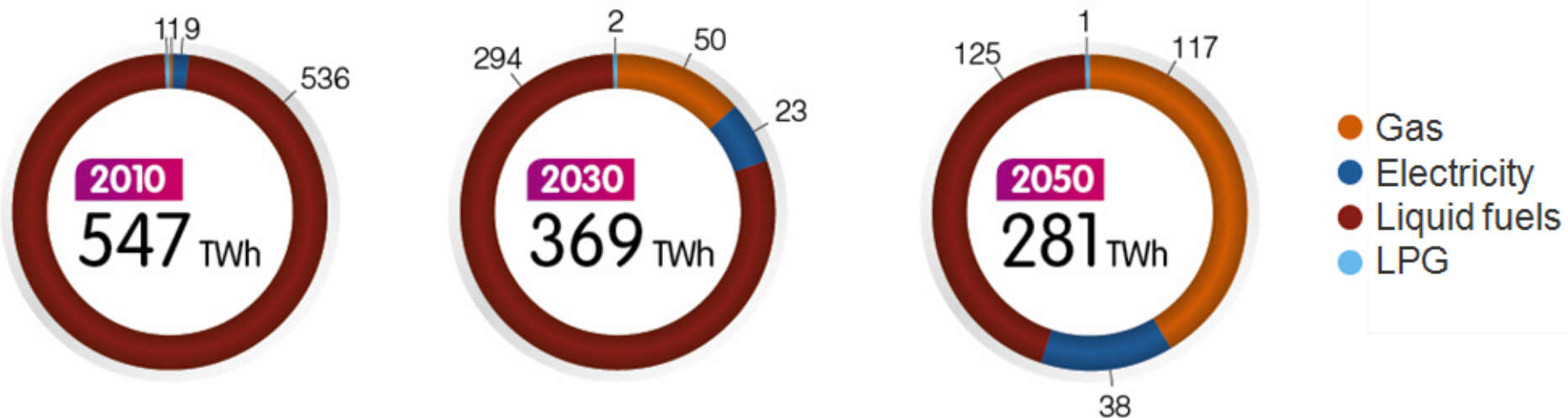
Decentralized energy generation : the future of gas utilization – study illustration



2050 time horizon

	Short distance	Medium distance	Long distance
<i>Personal vehicles / Utility vehicles</i>	<i>Electricity</i>	<i>Gas / Diesel, fuels...</i>	<i>Gas / Diesel, fuels...</i>
<i>Bus / autocar</i>		<i>Gas</i>	<i>Gas</i>
<i>Road transport</i>	<i>Gas</i>	<i>Gas</i>	<i>Gas</i>
<i>Fluvial / maritime transport</i>			<i>Gas</i>

Transport energy consumption (TWh per year)



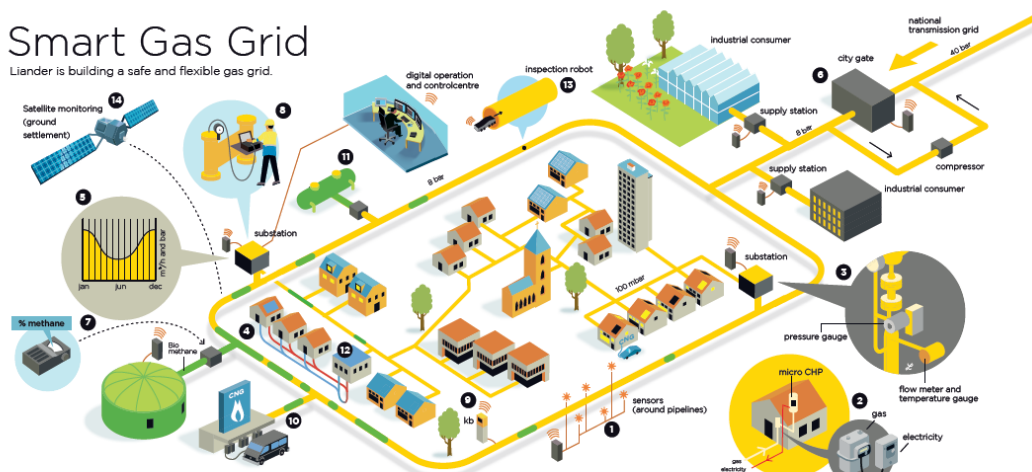
Thank you for your attention.



- > Smart networks synergies
- > Upstream: GRHYD
- > Downstream: on-going studies
- > roch.drozdowski@grdf.fr

Smart Gas Grid

Liander is building a safe and flexible gas grid.



Intelligent Gas Network Instrumentation

Liander can monitor and predict what is happening in the gas mains network and intervene in time using remote measuring and control equipment.

- 1 Gas Grid Monitoring**
Sensors measure ground vibrations, traffic loads, ground settlement, gas leakages, etc. around gas mains 24/7.
- 2 Smart Metering**
Gas meters record gas consumption profile and make this data available in digital format.
- 3 Measurements in stations**
Remote monitoring of gas inlet and outlet pressures, volumes and temperatures.
- 4 Gas Diffusion**
Sensors and computer models measure and predict gas flow diffusion and mixing.
- 5 Dynamic Pressure Management**
Varying the gas pressure depending on demand and supply.
- 6 City Gate**
Real-time GTS (Gasunie) data for gas outlet pressures, volumes, temperatures and quality.
- 7 Monitoring Gas Quality**
The quality of bio methane added to the grid is monitored 24/7.
- 8 Station Diagnostics**
Periodical diagnostics are run to ensure control systems are working properly.
- 9 Cathodic Protection**
Remote diagnostics and monitoring of the polymer coating around steel pipelines.
- 10 Gas for mobility**
Filling stations for gas used as vehicle fuel on the road and on the water.
- 11 Local Storage**
Storage of overcapacity of bio methane.
- 12 Energyhub in residential area**
CHP analog gas driven heat pump for district heating and electricity.
- 13 Inspection Robots**
Internal pipeline inspection.
- 14 Satellite Monitoring**
Monitoring ground settlement at a street and neighbourhood level.

