

# **ENERGY**

# **FUTURE CHALLENGES FOR**

# **EURAMET**

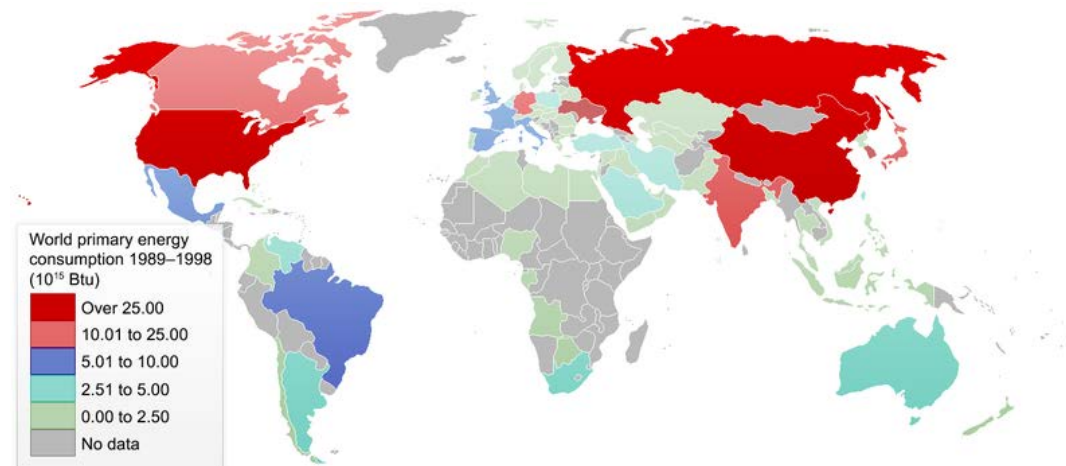
**Elsa Batista and François Piquemal**

**With the cooperation of other EURAMET TC Chairs**

# PROBLEMS

According to the International Energy Agency estimates, world primary energy demand is projected to increase by more than 30% until the year 2035. Rising demand in developing countries is diverting energy supplies away from Europe.

China alone is expected to use 20% of global energy by 2035.



Make the transition to a reliable, sustainable and competitive energy system, in the face of increasing scarce resources, increasing energy needs and climate change.





# METROLOGY TOOLS

To contribute to knocking down the **barriers** which prevent industrial developments required for the Energy transition.

- **Energy production**

biomass, fossil, geothermal, hydraulic, marine, nuclear, solar and wind energy

- **Energy consumption**

in agriculture, building, industry, lighting and transport

- **Network and storage**

electricity, gas, heat







# FUTURE

## Many possibilities of relevant JRPs in energy

- **Low carbon energy use**

Underpinning metrology in the efficient implementing of CO<sub>2</sub> capture, storage and re-use, fuel cell metrology ...



Fuel cell

- **Innovative metering technology**

High quality and reliable sensors for assessment of material and energy flows

- **Measurement standards for new fluids**

Development of measurement techniques and instruments for the emerging carrier fluids and multiphase fluids like the output of new oil fields, or steam



- **Materials, nanomaterials, nanotechnology**

Traceable characterization of material properties for solar, nuclear, biomass applications, *etc*

- **Smart grids (elec, gaz, heat)**

Metrology tools to control and smooth out the fluctuations of intermittent energies (e.g. phasor measurement unit)

- **Novel SSL lighting (LED, OLED)**

Traceability for efficacy, perception, life-time and flicker; advanced standards & methods

- **Energy network management**

Underpinning metrology for smart energy management at the scale of building (smart house), urban and grids based on numerical technologies (incl. wireless communications)





# PROJECTS 13 projects will start in 2014

## SolCell

SmartGrid II

ThinErgy

Biogas

PhotoClass

DriveTrain

VITCEA

## MultiFlowMet

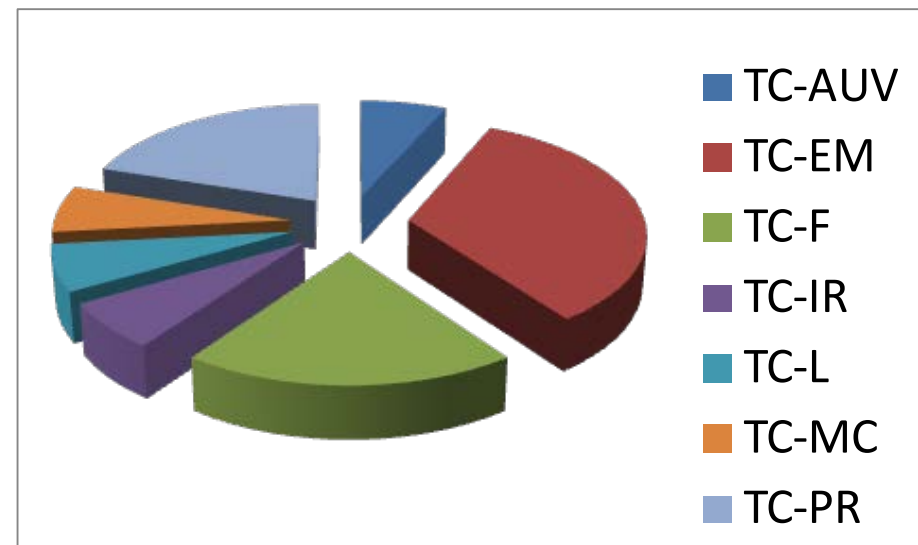
NonNewtonianLiquids

## LNG

FutureGrids

## MESaIL

GridSens







# **SOLCELL** Metrology for III-V materials based high efficiency multi-junction solar cells

To develop traceable metrological infrastructure in support of the rapid advances made on multi-junction solar cells that are based on III-V materials

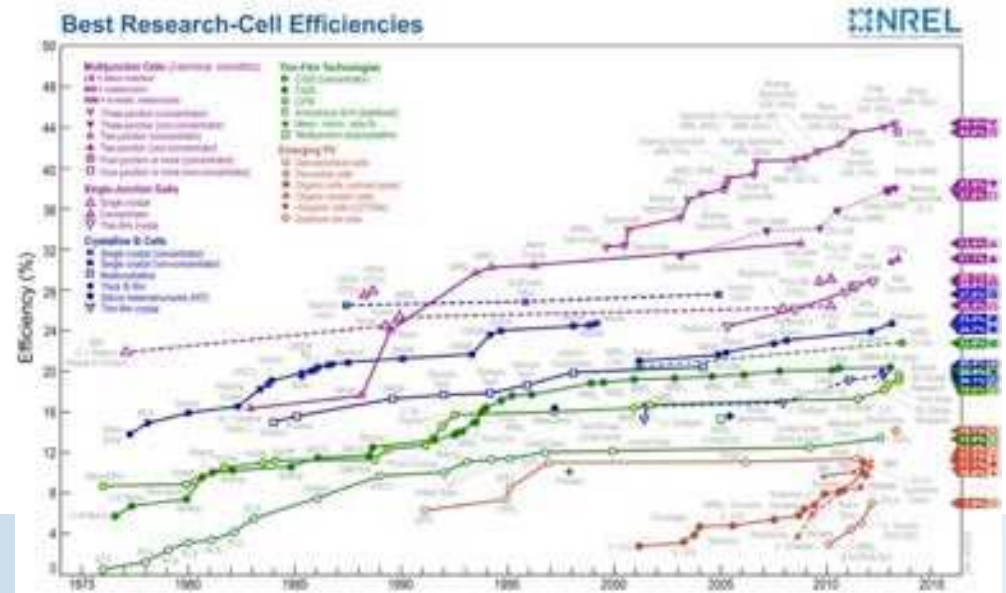


## **State of the art:**

3 junctions: 44 %  
4 junctions: 44.7 %



**But  $\sigma = 3\%$  !!!**

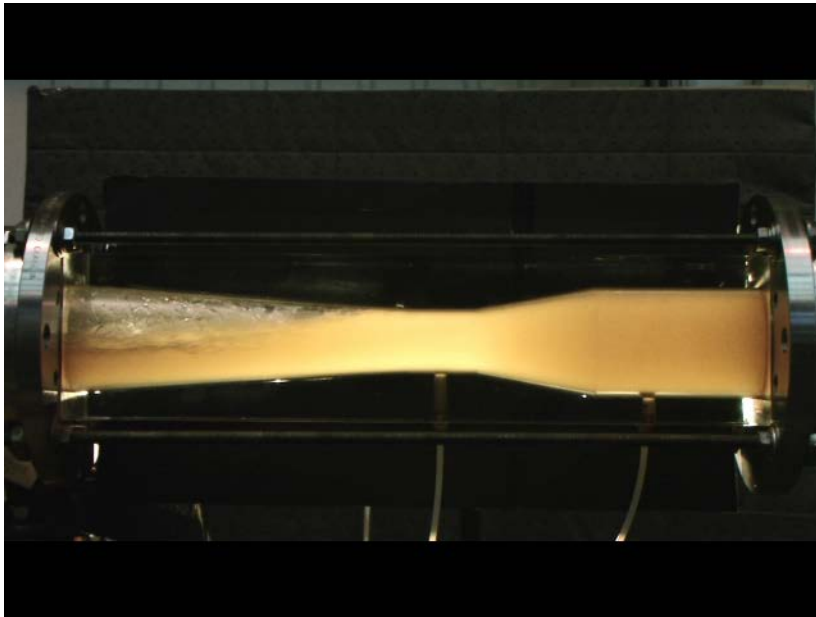




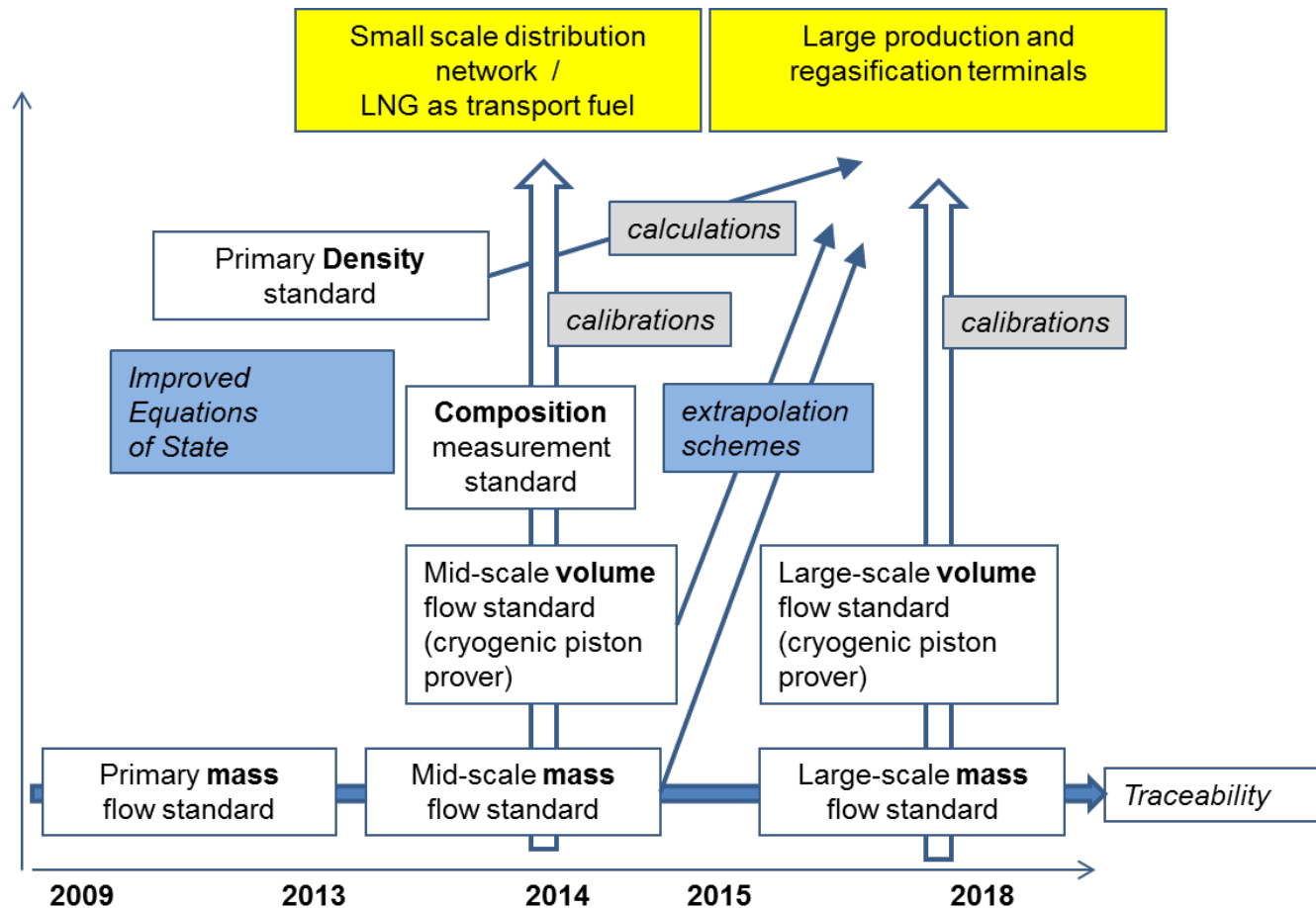


# **MULTIFLOWMET - MULTIPHASE FLOW METROLOGY IN THE OIL AND GAS SECTOR**

To establish the infrastructure for multiphase flowmeters to enable reliable evaluation / verification: sustainable reference network



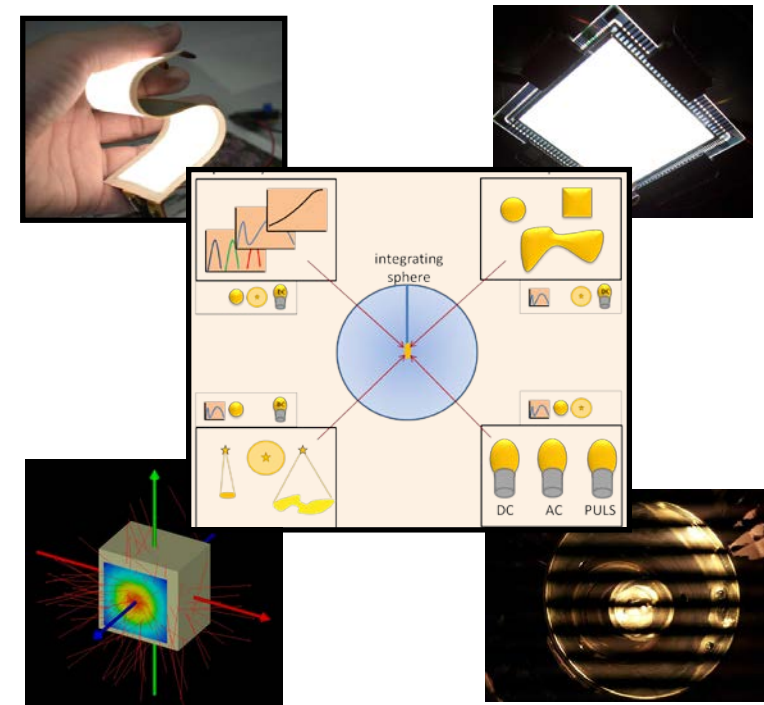
# LNG II - METROLOGICAL SUPPORT FOR LNG CUSTODY TRANSFER AND TRANSPORT FUEL APPLICATIONS



# MESaIL- METROLOGY FOR EFFICIENT AND SAFE INNOVATIVE LIGHTING

Deliver an advanced metrological framework for novel SSL

- transfer standards **applicable at NMI and test laboratory level**
- measurement solutions for **large area & pulsed SSL**
- metrics and equipment accounting for **safety & comfort aspects** of novel SSL
- **assure longer lifetime** by providing traceability.



# CONCLUSION

The big challenge of ecology transition in the Energy domain has opened a wide field of intervention for EURAMET in all the domains of physics and chemistry.

In the framework of EMPIR, all the TCs will continue their involvements.

## QUESTION:

Energy transition also requires a drastic change of the consumer behaviors.

*Which metrology actions could help consumers ?*



**Thank you!**