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Visão de mercado para novos produtos e negócios com biomassa de cana

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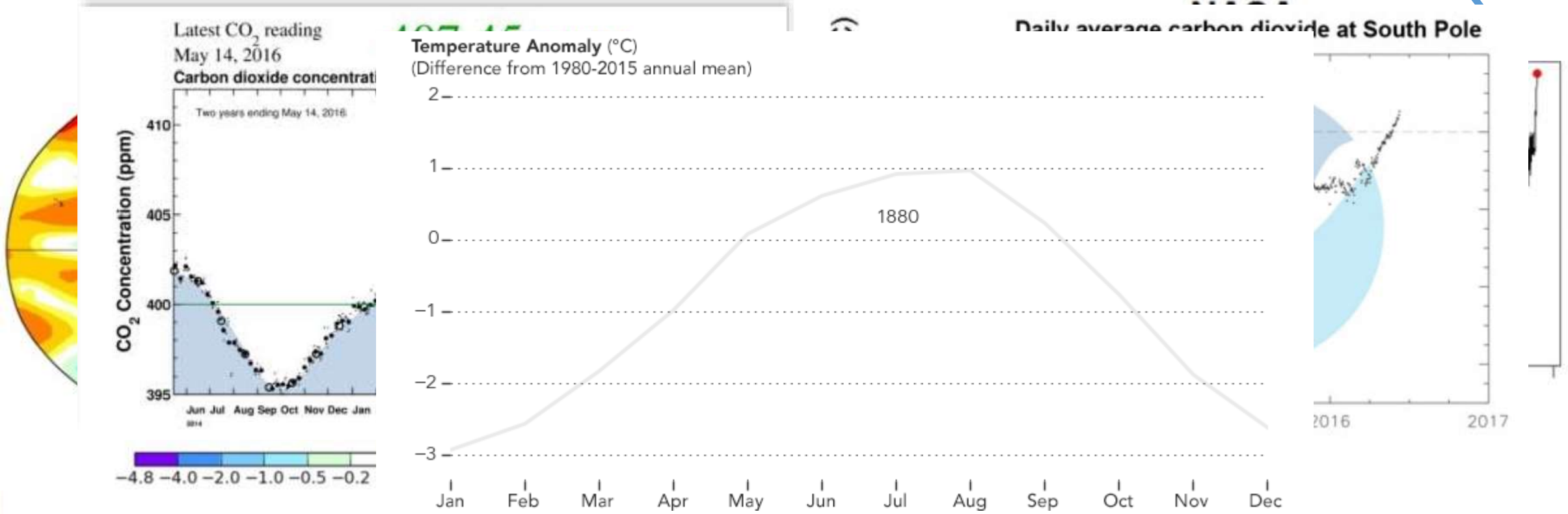
- Novos Negócios com a Biomassa da Cana
- O potencial da Biomassa da Cana
- Bioeconomia

EMERGÊNCIA!


Latest CO_2 reading
May 14, 2016
Carbon dioxide concentrat
Two years ending May 14, 2016
CO_2 Concentration (ppm)
410
405
400
395
Jun Jul Aug Sep Oct Nov Dec Jan
−4.8 −4.0 −2.0 −1.0 −0.5 −0.2
Temperature Anomaly (°C)
(Difference from 1980-2015 annual mean)
2
1
0
−1
−2
−3
1880
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily average carbon dioxide at South Pole
2016
2017

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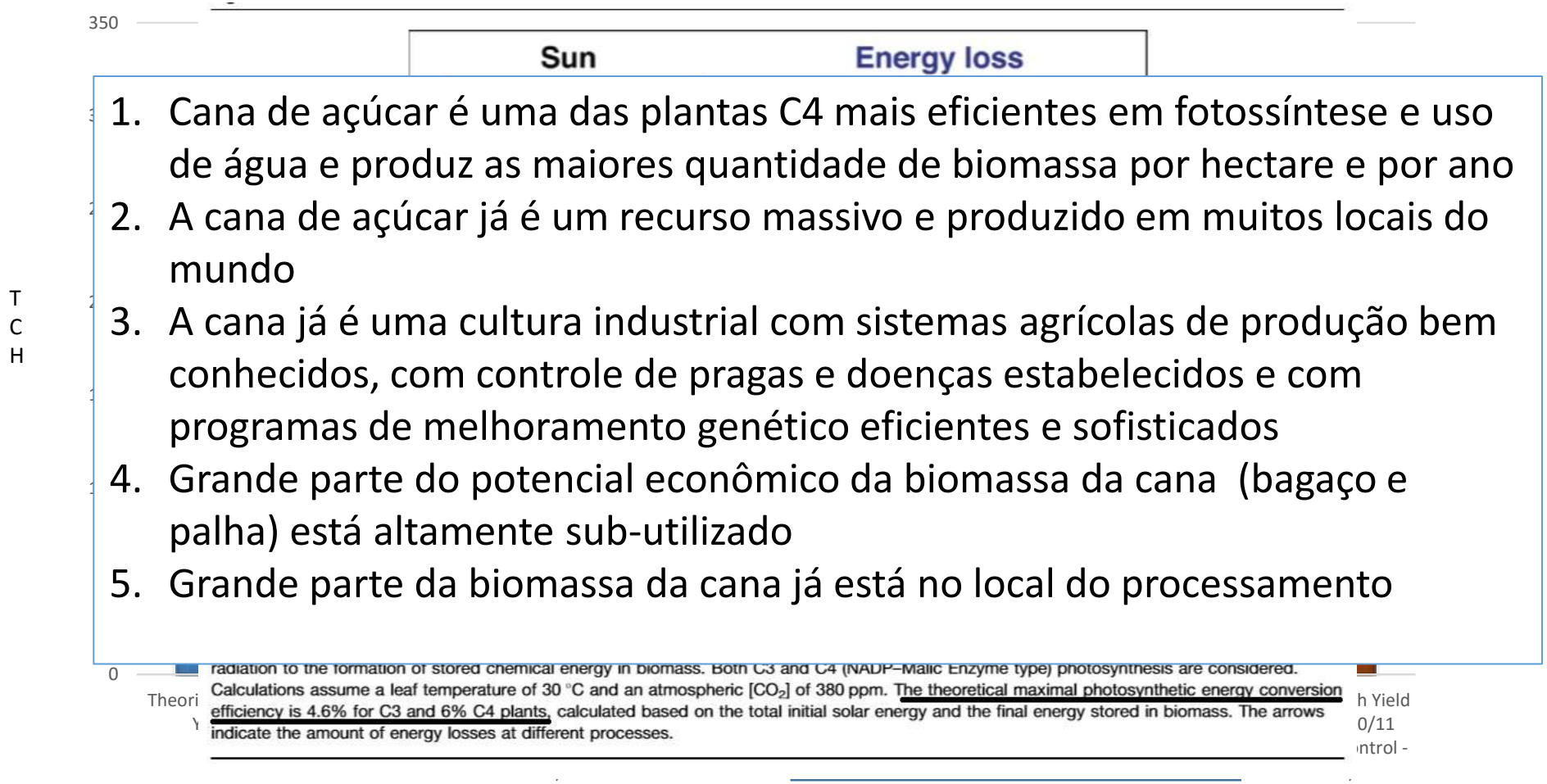
Theoretical Potential Yield vs Experimental vs Commercial

1. Cana de açúcar é uma das plantas C4 mais eficientes em fotossíntese e uso de água e produz as maiores quantidade de biomassa por hectare e por ano
2. A cana de açúcar já é um recurso massivo e produzido em muitos locais do mundo
3. A cana já é uma cultura industrial com sistemas agrícolas de produção bem conhecidos, com controle de pragas e doenças estabelecidos e com programas de melhoramento genético eficientes e sofisticados
4. Grande parte do potencial econômico da biomassa da cana (bagaço e palha) está altamente sub-utilizado
5. Grande parte da biomassa da cana já está no local do processamento



radiation to the formation of stored chemical energy in biomass. Both C3 and C4 (NADP–Malic Enzyme type) photosynthesis are considered. Calculations assume a leaf temperature of 30 °C and an atmospheric [CO_2] of 380 ppm. The theoretical maximal photosynthetic energy conversion efficiency is 4.6% for C3 and 6% C4 plants, calculated based on the total initial solar energy and the final energy stored in biomass. The arrows indicate the amount of energy losses at different processes.

Source: * Paul H. Moore, Physiological Constraints of Sugarcane Yield Potential, Centro de Tecnologia Canavieira, Piracicaba, 2015;
**Joaquim, A. C.; Penatti, C. P. & Casagrande, M. V. – Altas Produtividades de variedades CTC. Relatório Interno CTC, 2013

Preços do Petróleo 1960-2016

Source:
IFPEN 2016

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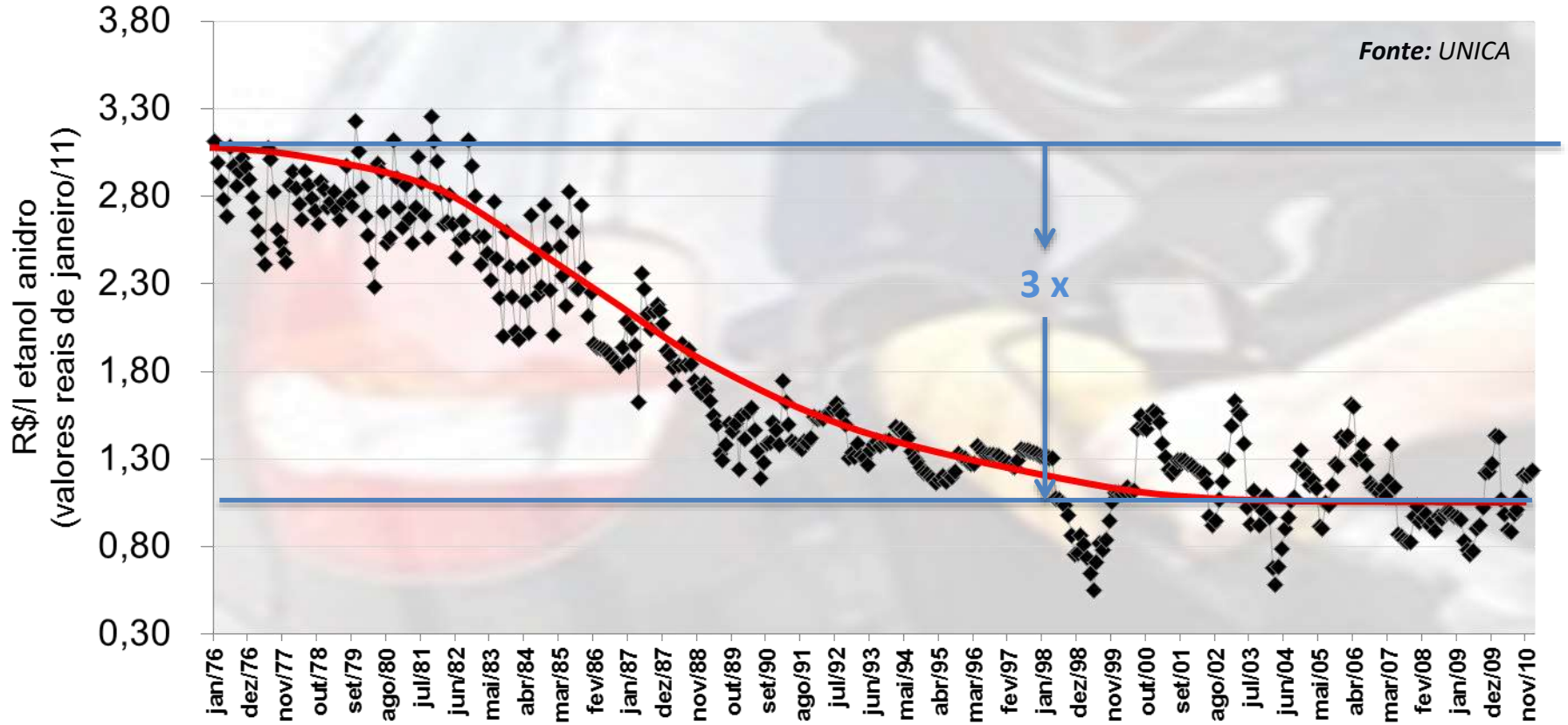
Evolução dos preços do Etanol (CONSTANT R$ deflated jan 2011)



Last year : 97 kg produts / TC or ~ R$ 103,00/TC = 3 kg wax= 0,5 kg yeast extract
Sugar in sugarcane 136,75 kg Total Sugars / TC Price of TS: R$ 0,4728 1 TC: R$64,66

Bioprodutos a partir da biomassa

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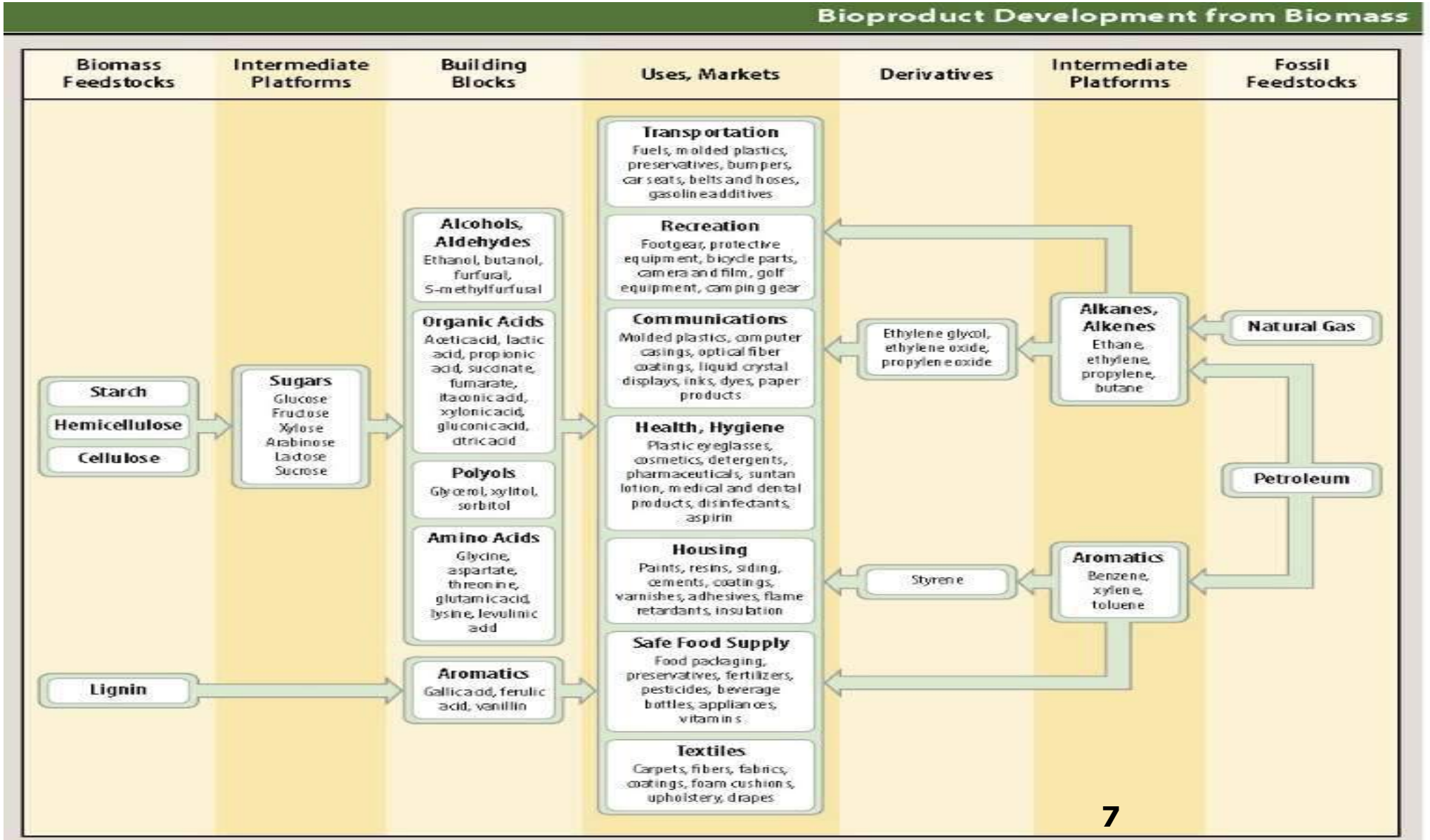

Fig. 10. Flowchart Comparing Potential Biomass- and Petroleum-Derived Products. Today, petroleum-derived prod-

O Futuro é a Biotecnologia!

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- Mais Biomassa (mais barata) com o aumento da produtividade (mais TCH!) -> *genômica, transcriptomica, melabolomica*
- Aumento no teor de açúcares fermentáveis
- Aumento da resistência da cana à estresses bióticos e abióticos: seca, pragas, doenças e ampliação das áreas geográficas (incluindo salinidade e geadas)-> *microbioma*
- Fibra da cana modificada para tornar mais o processo mais eficiente (aumento na “moabilidade”, redução da “recalcitrância”)
- Produção *in planta* de moléculas de alto valor tais como proteínas, enzimas, outros açúcares, óleos ou mesmo químicos e bioplásticos

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- Desenvolvimento de Processos Viáveis:
  - para converter a *biomassa integral* da cana
    - açúcares no caldo e no melaço,
    - bagaço,
    - palha,
    - bagacilho + torta de filtro + cinzas + fuligem ,
    - vinhaça
    - CO2 da caldeira e da fermentação
  - em produtos com demanda crescente
- Redução dos impactos ambientais -> aumento da sustentabilidade (pessoas, planeta e properidade)

Como caminharemos para este futuro?

- Reconhecimento da inviabilidade do modo de produção atual -> *crises locais e globais*
- Demanda por produtos e modos de vida mais sustentáveis -> *educação, informação*
- Ambiente de investimento que favoreça o risco e reconheça o potencial da biomassa da cana
- Redução gradual dos incentivos aos vetores fósseis (taxa de carbono)

Bioenergy in Brazil

- Ethanol (only from sugarcane, replacing gasoline only)
  - Sugarcane business is ~2% GNP
  - > 800.000 Jobs inland Brazil, salaries bigger than brazilian average
  - All sugarcane producing cities have better life indices than non sugarcane cities
  - The potential for increasing ethanol production from sugarcane is huge
    - Sugar and ethanol production use only 1/3 of the existing photosynthesis (the soluble sugars))
    - Sugarcane straw (leaves and top) underutilized (1/3 of the photosynthesis)
    - Bagasse energy use is inefficient (bagasse is burnt only to produce the energy actually needed)
  - Sugarcane productivity can increase twice or even three times with Ag Biotech breakthroughs

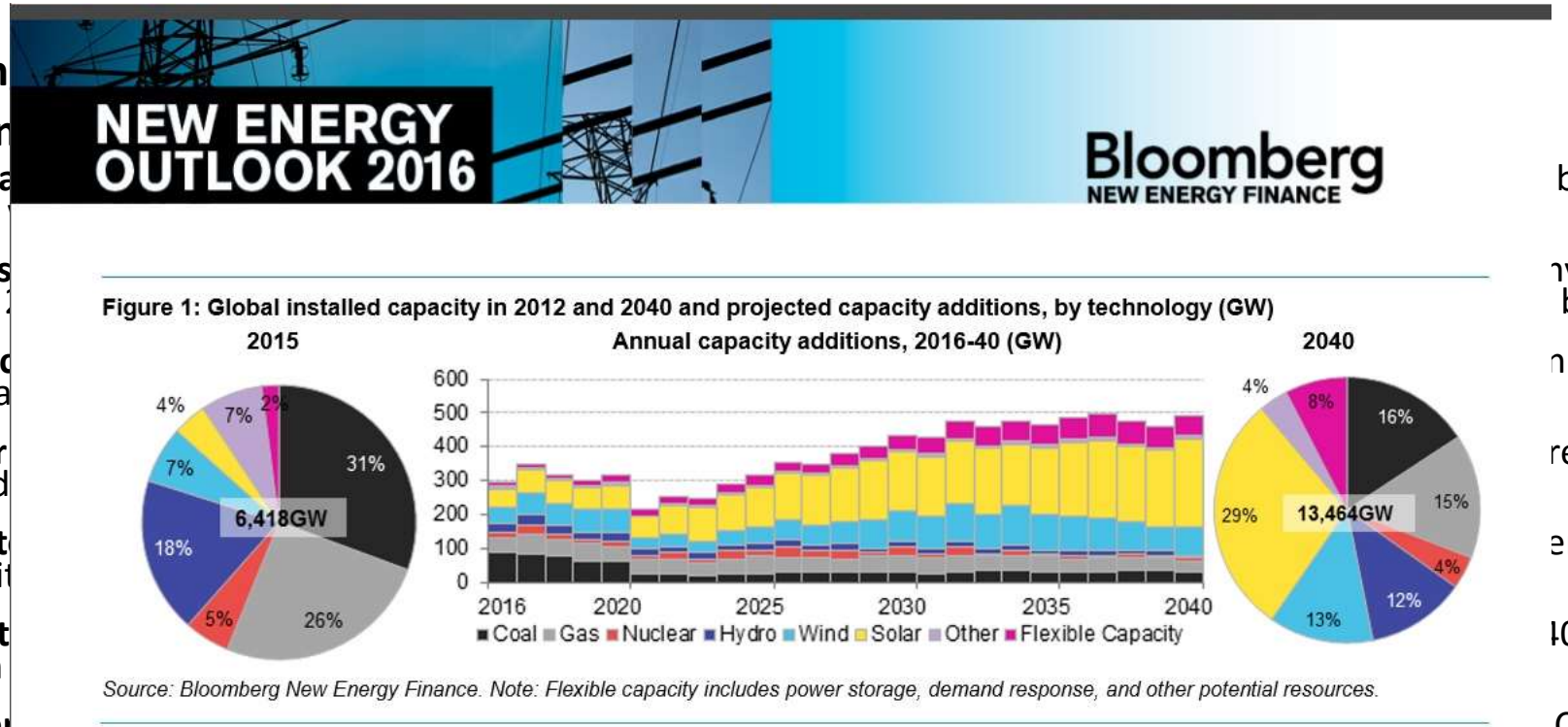
- Conclusion:
  - Sugarcane is the main crop to drive Bioeconomy
  - Significative, private INNOVATION can double sugarcane GNP
  - Sugarcane ethanol can fill the gaps in transportation fuels in a sustainable way
  - Sugarcane biomass can also produce electricity as well all the other types of biofuels but competitiveness has to be achieved
  - Economic conditions (internal and external) and expectations (investiment willingness) will set the “product’s basket” from sugarcane

Bioenergy in Brazil

http://www.evaristodemiranda.com.br/

Já somos uma das economias de mais baixo carbono, mas podemos melhorar. A fonte de 68% da energia renovável no País, que garantiu 28% da matriz energética brasileira em 2015, é a agropecuária.

Energy in the World



- **Power findin**
- **8 eye-catchin**
  - **Coal and ga** by burning coal or gas, but
  - **Wind and s** ny countries during the by 60% by 2040.
  - **Asia-Pacific** n the near-term, China rema
  - **Electric car** resent 35% of new light-d
  - **Cheap batt** er storage and working wit
  - **A limited 't** 40, and generation
  - **Coal's diver** China; however it increases 7% globally due to rapid growth in other Asian and African emerging markets.
- **2°C scenario**. On top of the forecasted $9.2tn investment in zero-carbon power, an extra $5.3tn is needed by 2040 to prevent power-sector emissions rising above the IPCC's 'safe' limit of 450 parts per million.

Energy in the World

- McKinsey Energy outlook: Key insights Is peak oil demand in sight?

Our business-as-usual case integrates the latest McKinsey view on economic-growth fundamentals and granular sector and regional insights. Six key points have emerged:

- Growth in global energy demand will decelerate to 0.7 percent per year through 2050, a rate 30 percent slower than we had previously forecast.
- Emerging and developing countries will drive all growth in energy demand, while European and North American demand will decline.
- Chemicals will grow at more than double the rate of total energy demand, while light-vehicle demand will peak around 2023.
- Demand for electricity will outpace demand for other energy sources by more than two to one. Solar and wind will represent almost 80 percent of net added capacity and 34 percent of generation by 2050.
- Fossil fuels will dominate the total energy mix through 2050, but their share of total energy will decline to 74 percent from 82 percent. While gas is a relative winner (growing at almost twice the rate of total energy demand), coal will peak by 2025, and oil demand growth will flatten to 0.4 percent.
- Energy-related carbon dioxide emissions will flatten and start to decline around 2035 as a result of the transformation of light vehicles (more-efficient combustion engines and more electric vehicles on the roads) and the strong shift to wind and solar in power generation.

Energy in the World: The End of Fossil Subsidies

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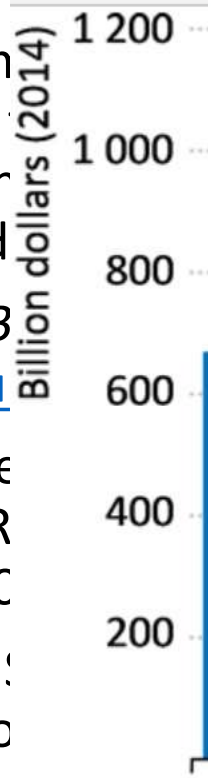
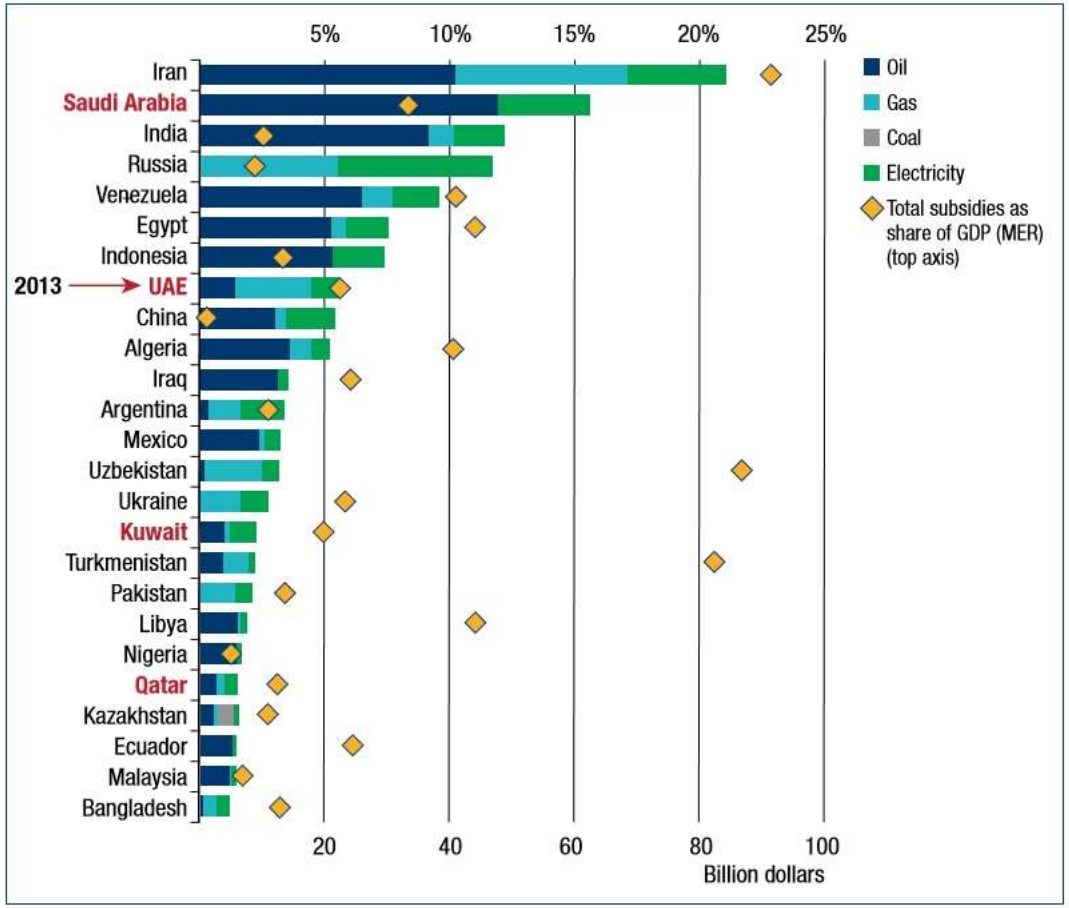


Figure 1: International fossil fuel subsidies in 2013

Source: International Energy Agency, World Energy Outlook 2014, November 2014.



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Brazil: 2.35% GNP

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Muito Obrigado!

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