

Ukrainian Energy Index

SYSTEM CAPITAL MANAGEMENT

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System Capital Management (SCM)

- SCM key businesses:
 - Steel and mining industries
 - Energy sector
 - Finance
 - Telecommunications
 - Real estate
 - Media
- SCM is the biggest employer in Ukraine – 260,000 employees
- SCM key consolidated indicators in 2010:
 - Total assets – \$22.8 bn
 - Gross revenue – \$12.9 bn
 - Profit before taxes – \$1.3 bn

Motivation

- Energy efficiency as a precondition for SCM competitiveness
 - Annual energy consumption of industrial holdings is 8.7 MTOE
 - DTEK holding – 4.55 MTOE
 - METINVEST holding – 4.15 MTOE
 - 2/3 of the produced steel is sold abroad
 - Obligations before the Energy Community contain new environmental requirements
 - Investments in energy efficiency reached \$110 m in 2010
- Energy efficiency and SCM's sustainable development policy
 - Continuous improvement of the environmental and social performance of the company
 - Long-term profit to investors
- SCM – initiated the first energy efficiency monitoring at regional level in Ukraine “Ukrainian Energy Index”



Ukrainian Energy Index (UEI) goals

- Analyze the energy efficiency at regional level
- Estimate the energy saving potential for each region
- Determine the biggest opportunities to boost energy efficiency at both local and state levels

How the first UEI (October 2011) has been applied so far?

- State energy policy
 - National Agency on Energy Efficiency and Energy Saving – National Report on Energy Efficiency Policy
 - Foundations for Effective Governance – Energy Strategy for Ukraine till 2030
- Local energy policy
 - The Governor of the Donetsk region (biggest energy consumer) A. Shyshatsky: “UEI is the barometer for policy check”
 - The Governor of Dnipropetrovsk region (2nd biggest energy consumer) O. Vilkul: “UEI allows to determine the energy saving potential and directions for further reforms in the region”
- DTEK (SCM energy holding) – preparation the 14 PPP projects on energy efficiency improvement

Case study: DTEK PPP project in Kurahov City

- Financing energy efficiency measures in residential sector:
 - USAID grant – \$228,125
 - DTEK – \$362,125
- Annual energy saving –\$122,500
- Kurahov City major benefits
 - possibility to raise tariffs and cut budget expenditures on heavily subsidized heating tariffs
 - tariff increases have no impact on consumer welfare
 - quality of heating services is much higher after the implementation of energy efficiency measures
- DTEK benefits
 - obtain payments directly from the consumer
 - eliminate the persistent problem of city arrears for heating

Table 1: Proposed Decomposition of Final Energy Consumption

Sector	Sub-sector	Intensity
Industry		<i>energy</i>
	mining	<i>value added</i>
	chemical	—“—
	primary metals	—“—
	wood	—“—
	paper, pulp and printing	—“—
	food	—“—
	textile and leather	—“—
	machinery	—“—
	transport equipment	—“—
	rubber and plastics	—“—
	other manufacturing	—“—
	Other industries	
	construction	—“—
	agriculture	—“—
Services		
Transport		
Passenger		
	cars	energy/pkm
	buses	energy/pkm
	rail	energy/pkm
Freight		
	trucks	energy/tkm
	rail	energy/tkm
Residential		
	space and water heating	energy/floor area
	other residential consumption	energy/# of dwellings

The Methodology of Ukrainian Energy Index

- SCM's methodology is based on IEA's decomposition of energy consumption – Trudeau and Murray (2011)
- Energy efficiency estimates take into account the structure of the regional economy
- State Statistical Service data limitations
 - first energy balance for Ukraine was calculated only in 2012
 - residential sector required additional surveying for consumption decomposition
 - both freight and passenger transportation required data from additional sources
- The pilot UEI decomposes TFEC of the region into:
 - 1 consumption of agriculture
 - 2 consumption of mining and 10 manufacturing industries
 - 3 consumption of service sector
 - 4 consumption of residential sector



Table 2: Variables and Energy Efficiency Indicators in Pilot Study

Sector	Sub-sector	Intensity
Industry		
	mining	$\frac{\text{energy}}{\text{value added}}$
	chemical	—“—
	primary metals	—“—
	wood	—“—
	paper, pulp and printing	—“—
	food	—“—
	textile and leather	—“—
	machinery	—“—
	transport equipment	—“—
	rubber and plastics	—“—
	other manufacturing	—“—
Other industries		
	agriculture	—“—
Services		—“—
Residential		
	residential consumption	$\frac{\text{energy}}{\text{floor area}}$

Ukrainian Energy Index

The benchmark of region's energy efficiency – energy intensity of the correspondent industry in the EU.

Following Trudeau and Murray (2011) the *energy intensity effect* for region n :

$$E_{R_n}^I = \frac{A^{EU} \sum_i (S_i^{EU} * I_i)}{E^{EU}}, \text{ where} \quad (1)$$

E – total energy use in a sector

A – overall sectoral activity

i – sub-sectors index within a given sector

S_i – share of sub-sector i within a given sector

I_i – energy intensity of each sub-sector i .

Ukrainian Energy Index

- *Hypothetical energy use* $HEU_n = \frac{E_n}{EI_{R_n}}$ – the energy use that would have occurred in the region if energy intensities reached the EU level
- *Hypothetical energy savings* (HES_n) from reduced energy intensities – the difference between the actual and the hypothetical energy use
- The region's *energy efficiency indicator* – a percentage of the efficient energy use

$$R_n = \left(1 - \frac{HES_n}{E_n}\right) * 100\% \quad (2)$$

Example: Comparison of industry's energy efficiency in Donetsk and Ternopil oblasts

- ❶ Simple comparison of energy intensities:
Energy intensities in Donetsk and Ternopil oblasts are 1.03 and 0.35 TOE/€1000PPP.
⇒ Industry in Donetsk oblast is 3 times less efficient than in Ternopil
- ❷ Decomposition of energy consumption and making adjustment for the structure of the economy:
Energy efficiencies in Donetsk and Ternopil oblasts are 50.6% and 43.9% of the EU level.
⇒ Industry in Donetsk oblast is 6.7% more efficient than in Ternopil oblast

Data

- Ukrainian data – State Statistical Service of Ukraine
- EU data – Enerdata ODYSSEE database (27 EU countries + Norway and Croatia)
- Data on PPP calculation – World Bank, OECD and European Central Bank

Energy efficiency at regional level

- Energy efficiency is only 52% compared to the EU
- The shares of industry, residential sector, services and agriculture in potential energy saving amount to 62%, 30%, 5% 3% respectively
- Leaders are about two times more efficient than outsiders of the rating
- Except Odesa region, there are no regions in the top 10 of the rating that have energy intensive manufacturing industries

Figure 1: Energy Efficiency at Regional Level (% of EU)

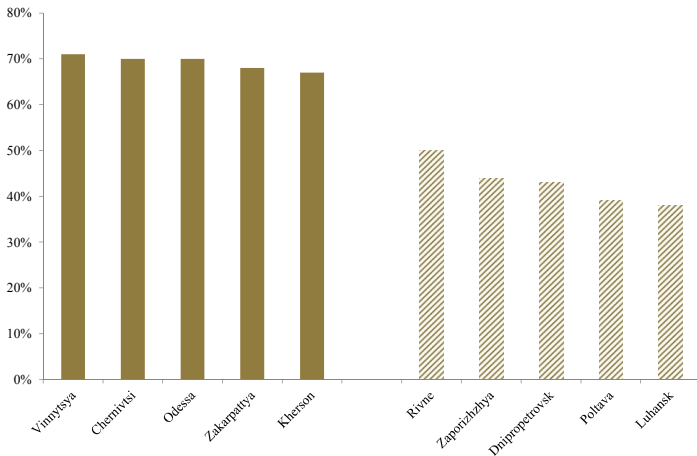


Figure 2: Energy Intensities of Ukraine and EU

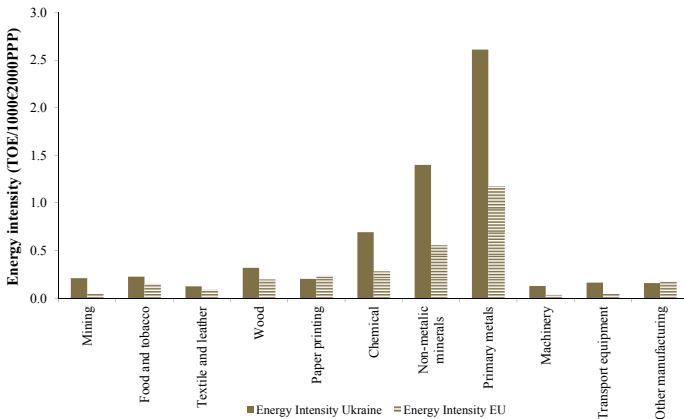


Figure 3: Energy Efficiency of Some Industries at Regional Level

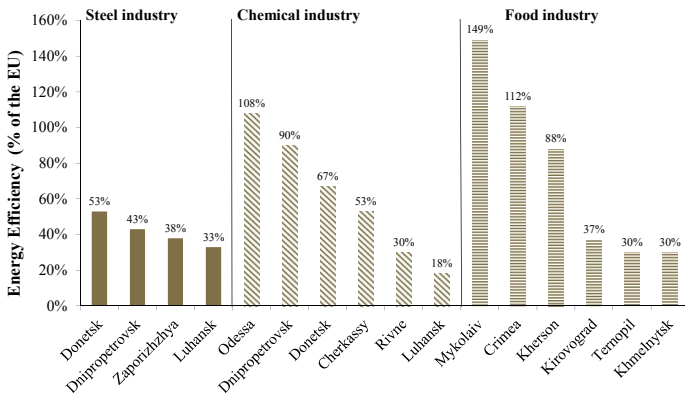
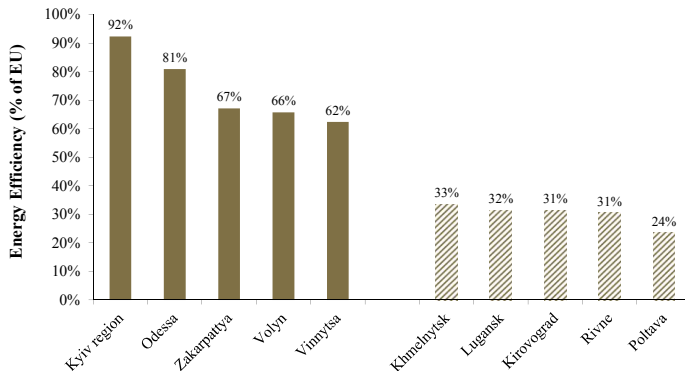


Figure 4: Energy Efficiency Rating of Industry



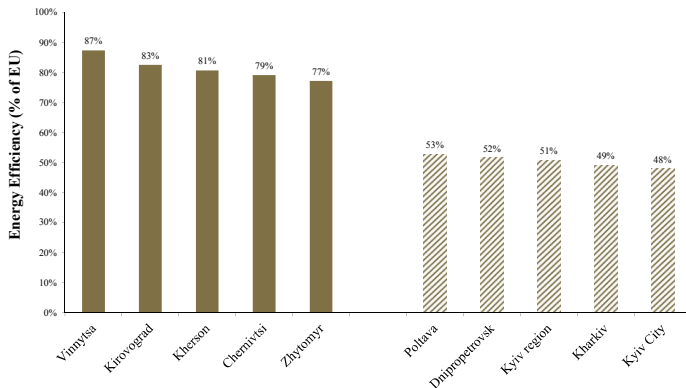
Energy efficiency of agriculture

- Energy efficiency of agriculture in Ukraine is only 33% from the EU level
- Average consumption per 1 hectare is not much lower in Ukraine compared to the EU (100 kgoe and 140 kgoe respectively)
- Low energy efficiency is a result of the low value added in the sector
- Wheat harvest:
 - Ukraine – 2.4 tonnes per hectare
 - Poland – 4.0 tonnes per hectare
 - Germany – 8.0 tonnes per hectare

Energy Efficiency of residential sector

- Lack of energy consumption meters
- Inefficient tariff policy
- Lack of reforms at the state level:
 - high monopolization of the provided services
 - lack of incentives for decentralization and demonopolization of services provisions
- Standards of living and quality of the provided services vary substantially across regions

Figure 5: Energy Efficiency Rating of Residential Sector



Conclusion

- Energy efficiency varies substantially accross regions
- Energy intensive industries also demonstrate the lowest energy efficiency
- The lowest places in the rating are occupied by regions with inefficient energy intensive industries and inefficient residential sector
- Total energy saving potential in 4 sectors amounts to 27.3 MTOE (€11.8 bn)
 - Industry 16.8 MTOE (€7.3 bn)
 - Residential sector 8.3 MTOE (€3.6 bn)
 - Agriculture 1.3 MTOE (€600 m)
 - Services 0.86 MTOE (€387 m)

UEI 2012

- UEI 2012 will look on energy efficiency dynamics in 2007—2011
- Transport sector will be added
 - cars – vehicle energy/100km
 - buses – energy/pkm
 - passenger rail – energy/pkm
 - trucks – energy/tkm
 - freight rail – energy/tkm
- Residential energy consumption will be decomposed into
 - space heating – energy/floor area
 - water heating – energy/#occupied dwellings (upon data availability)
 - cooking – energy/#occupied dwellings
 - lightning and appliances – energy/#occupied dwellings
- Construction will be added as the separate industry



How the UEI 2012 will be applied?

- National level
 - drafting the National Plan on Economic Reforms for 2013
 - drafting the National Report on Energy Efficiency Policy in 2012
 - possible revision of the Energy Strategy for Ukraine till 2030 draft
- Regional level
 - monitoring the success of energy efficiency reforms
 - setting-up the priorities for energy efficiency measures
- Private sector
 - design the sustainable business development strategy
 - determine the PPP projects with the highest rate of return
- Academy
 - e.g. the real sector contains 1430 panel observations (11 industries*26 regions*5 years) – interesting opportunities for parametric analysis