PECTA
Power Electronic Conversion Technology Annex

China – IEA TCP Workshop
Beijing, China, 29 March 2019

Roland Brüniger – Interim Chair (Switzerland)
Peter Bennich – Chair (Sweden)
Adriana Diaz – Vice-Chair (Austria)

Markus Makoschitz - Operating Agent, PECTA Power Electronic Conversion Technology Annex
PECTA Background (Opportunities)

Pre-scoping study: New power electronic materials and devices and its impact on the energy efficiency
Swiss Federal Office of Energy, October 2018;
(https://www.aramis.admin.ch/Texte/?ProjectID=40173)

WBG-Potential for Laptop, Tablets, Cell Phones:

**Table 3. Potential impact of WBG components on global energy use.**

<table>
<thead>
<tr>
<th>Transistor Material</th>
<th>Application</th>
<th>Average power rating (W) (1)</th>
<th>Average active mode efficiency (2)</th>
<th>Annual loss per unit (kWh)</th>
<th>2014 Global sales (MM) (3)</th>
<th>Assumed product life (yrs) (3)</th>
<th>Global stock (MM units in service)</th>
<th>Annual electricity loss by global stock (GWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Si</strong></td>
<td>Laptop</td>
<td>60</td>
<td>87%</td>
<td>11.0</td>
<td>250</td>
<td>3</td>
<td>750</td>
<td>8,250</td>
</tr>
<tr>
<td></td>
<td>Tablet</td>
<td>12</td>
<td>80%</td>
<td>1.9</td>
<td>250</td>
<td>3</td>
<td>750</td>
<td>1,425</td>
</tr>
<tr>
<td></td>
<td>Cell phone</td>
<td>5</td>
<td>63%</td>
<td>4.2</td>
<td>1,870</td>
<td>3</td>
<td>5610</td>
<td>23,562</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33,237</td>
</tr>
<tr>
<td><strong>WBG</strong></td>
<td>Laptop</td>
<td>60</td>
<td>90%</td>
<td>8.5</td>
<td>250</td>
<td>3</td>
<td>750</td>
<td>6,346</td>
</tr>
<tr>
<td></td>
<td>Tablet</td>
<td>12</td>
<td>85%</td>
<td>1.5</td>
<td>250</td>
<td>3</td>
<td>750</td>
<td>1,096</td>
</tr>
<tr>
<td></td>
<td>Cell phone</td>
<td>5</td>
<td>72%</td>
<td>3.2</td>
<td>1,870</td>
<td>3</td>
<td>5610</td>
<td>18,125</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25,567</td>
</tr>
<tr>
<td><strong>WBG Savings (GWh/year)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,670</td>
</tr>
<tr>
<td><strong>WBG Savings (TBtu/year)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26.2</td>
</tr>
</tbody>
</table>

Sources: 1 (Navigant Consulting Inc. et al., 2012), 2 (Eykyn, 2013; Gartner, 2014), 3 (Boyd et al., 2009)
Challenges for the wider implementation of WBG technology

- No clear identification of applications, in which WBG semiconductor devices creates the largest savings;

- Missing awareness and the lack of appropriate and well-founded knowledge of WBG semiconductor devices avoids appropriate policy measures.

- Almost no international standards available and therefore no MEPS or any policy measures are principally possible;

- Cost of fabrication of WBG semiconductor devices is approximately five times more than silicon power devices.
PECTA’s Goal and Objective addressing existing challenges

- **Identification of potential areas of WBG;**

- **Identification of hurdles and proposing policy action to eliminate them**

- **Making recommendations for policy action to facilitate the entrance of WBG into market;**

- **Bring together the Policy Makers with the WBG-based power electronics Experts;**

- **Collecting and analysing information on new WBG-based power electronics;**

- **Promote government actions that encourage the use of the WBG-based power electronics;**

- **Coordinating internationally acceptable government approaches that promote the WBG-based power electronics;**

- **Provide information to policy makers --> Policy makers can access resources on WBG technologies.**

**PECTA serves as independent knowledge platform**
PECTA’s role with key sectors

- Research & Development of Semiconductors (Materials)
- Semiconductor Material Manufacturer (Semiconductors)
- Semiconductor Device Manufacturer (Devices, Modules)
- System Manufacturers (Power Supply, Converter, etc.)
- Standardization (Measurement Standard, Performance Standards, etc.)
- Customer (Power Supplies, Communication Devices, Motor Drives, Converters, etc.)

PEC TA

Information exchange
P olicy measures
Info exchange and Interaction
For information and for joining PECTA, contacts us!

PECTA Chair:
Peter Bennich: peter.bennich@energimyndigheten.se

Vice Chair:
Adriana Díaz: diaz@ecodesign-company.com

Member of Management Team:
Roland Brüniger: roland.bruniger@brueniger.swiss

Operating Agent:
Markus Makoschitz: Markus.Makoschitz@ait.ac.at

For further information see: https://pecta.iea-4e.org